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UNITED STATES AIR FORCE

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EPI REPORT

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ELECTRONIC PRINCIPLES

AIR FORCE MILITARY TRAINING CENTER (AFMTC)

AFSC 30650

AFPT 90-EPI-825

FEBRUARY 1990

OCCUPATIONAL ANALYSIS PROGRAM
USAF OCCUPATIONAL MEASUREMENT CENTER
AIR TRAINING COMMAND
RANDOLPH AFB, TEXAS 78150-5000

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PREFACE

This report presents the results of an Air Force Electronic Principles survey of AFSC 30650, Electronic Communications and Cryptographic Equipment Systems Specialist. Authority for conducting Electronic Principles (EP) surveys is contained in AFR 35-2.

Results presented in this report are part of an EP survey of 81 Air Force specialties. This survey was requested by the Chief, Common Electronics Training Program (CETP) Program Management Team (PMT) in October 1985.

The Electronic Principles Inventory (EPI) used to collect EP survey data was originally developed in 1976 by Dr Hendrick Ruck and Major Thomas O'Connor. Mr Theodore Wilcox revised and validated the EPI in 1986 as part of this survey project.

First Lieutenant Robert Hampel analyzed the data and wrote the final report. Computer programming support was provided by Ms Olga Velez and Mr Wayne Fruge, and Ms Raquel A. Soliz provided administrative support. This report was reviewed and approved by Mr Gerald Clow, Chief, Management Applications Branch, Occupational Analysis Division, USAF Occupational Measurement Center.

This report is distributed to Air Staff sections, major commands, and other training and management personnel. Requests for additional copies should be sent to Chief, Occupational Analysis Division (OMY), USAF Occupational Measurement Center Randolph AFB, Texas 78150-5000.

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REPORT SUMMARY

1. BACKGROUND: This report provides data on electronic principles (EP) used by DAFSC 30650 personnel. This data provides insight on EP training needs for 306X0 personnel.
2. METHODOLOGY: The USAF Electronic Principles Inventory (AFPT 90-EPI-825, June 1987) was administered to a randomly selected sample of fully qualified job incumbents in DAFSC 30650. The data were collected from September 1987 to April 1988.
3. RESULTS: Complete survey data is provided in three appendices. A "generic" version of the Electronic Fundamentals/Applications (EF/A) is used in Appendix B--complete analysis requires the use of 30650 proficiency codes, rather than the generic set used in the Appendix. The POI for course L3ABR30630 was largely supported by survey data. Survey data showed 69 EPI items not referenced to the POI that were used by at least 30 percent of the sample. These items should be considered for inclusion into the POI. Following is a list of all appendices:
 - Appendix A: 30650 EP data in EPI job inventory order
 - Appendix B: 30650 EP data matched to Electronic Fundamentals/Applications (EF/A) STS
 - Appendix C: 30650 EP data matched to POI L3ABR30630, dated 22 September 1986
4. DISCUSSION: This EP survey data shows the operational use of electronic principles by fully qualified, worker-level job incumbents in the 306X0 specialty. Presently, there is no specific regulatory guidance on the use of EPI survey data; however, this data does provide insight into the EP training requirements for 306X0 personnel.

ELECTRONIC PRINCIPLES SURVEY REPORT
DAFSC 30650

INTRODUCTION

From missile systems maintainers to telephone switching specialists, from avionics technicians to biomedical equipment personnel, the U.S. Air Force employs more than 50,000 worker-level (primarily 5-skill level) personnel who require electronic principles (EP) training. These highly skilled, technically trained airmen work in over 80 Air Force specialties (AFSs) spanning 11 career fields. Furthermore, the depth and breadth of required EP training varies based on specialty needs. In short, the USAF spends vast amounts of money, manpower, and time to ensure that airmen are properly trained in electronic principles.

To make the best use of these resources, the USAF Common Electronics Training Program (CETP) was designed to consolidate and standardize Air Force EP training where possible and practical. This is primarily accomplished through special EP courses taught at four USAF Technical Training Centers (TTCs). These EP courses teach the electronic principles common to two or more AFSs. Another part of the CETP is the development of common training modules. Specific blocks of EP instruction are developed by one TTC, then shared with the other TTCs which teach that EP subject. By selectively combining and standardizing Air Force EP training, the USAF makes best use of limited training resources.

Not all Air Force electronic principles training is conducted in special EP courses, however. For example, some EP subjects are used in only one AFS. Students learn these generally advanced topics in AFSC-awarding courses, building on the more basic EP subjects from the common EP course. Also, some AFSs require very few electronic principles, and airmen in these specialties receive EP training only in their AFSC-awarding courses.

As with other Air Force technical training, EP training programs can profit from objective analysis of specific training requirements. These requirements can be analyzed objectively using occupational survey data. This EP survey provides data which can be used to analyze the specific EP training requirements in CETP courses and AFSC-awarding courses alike. The instrument used to collect EP survey data is the Electronic Principles Inventory (EPI).

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BACKGROUND

The USAF Electronic Principles Inventory (EPI) is a knowledge- and skills-based job inventory which identifies the electronic principles, skills, and equipment an airman uses in the performance of his or her job.

The EPI was originally developed by Dr Hendrick Ruck and Major Thomas O'Connor in 1976. An in-depth discussion of the original concept, development, and validation of the EPI can be found in USAFOMC Technical Note 77-02, "The Development and Application of the Electronic Principles Job Inventory". Mr Theodore Wilcox revised and validated the EPI in 1986 for this survey.

The EPI contains two sections. First is a background section containing demographic and job satisfaction questions. The second section contains 712 electronic principles, skills, and equipment questions covering 39 EP subject areas. Below are some example questions taken from the EPI. The 39 EPI subject areas are listed in Table 1.

After completing the background section, job incumbents respond "Yes" or "No" to the 712 EPI questions. The result is a "profile" of electronic principles, skills, and equipment used by the incumbent in his or her present job. This electronic principles "profile" can be combined with the "profiles" of other job incumbents to produce a "profile" for the entire AFS.

EXAMPLE EPI QUESTIONS

Example Principles Questions

- A4-4 Do you use electron tube characteristic curves?
- G1-20 Do you use parity bit codes?
- H4-33 Do you use "FM" modulation principles?

Example Skills Questions

- C1-8 Do you calculate values of transistor amplifier voltage, current, or power gain?
- E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters?
- I1-4 Do you measure RF effective power?

Example Equipment Questions

- B4-2 Do you use spectrum analyzers?
- O3-5 Do you perform tasks on variable resistor voltage regulators?
- J1-8 Do you work on dynamic microphones?

TABLE 1
EPI SUBJECT AREAS

<u>SUBJECT AREA NUMBER</u>	<u>SUBJECT AREA TITLE</u>
A1	Direct/Alternating Current
A2	Electro/Mechanical Devices
A3	Solid-State Circuits and Devices
A4	Tubes
A5	Soldering or Solderless Connections
B1	Multimeters
B2	Oscilloscopes
B3	Signal (Function) Generators
B4	Test Equipment
C1	Transistor Amplifier Circuits
C2	Transistor Amplifier Stabilization Circuits
C3	Coupling Circuits
C4	Electron Tube Amplifier Circuits
C5	Operational Amplifiers
C6	Magnetic Amplifiers
D1	Power Supply Circuits
D2	Power Supply Filters
D3	Power Supply Voltage Regulators
E1	Resistive Capacitive Inductive Circuits
E2	Frequency Sensitive Filters
F1	Oscillators
F2	Multivibrators
F3	Waveshaping Circuits
F4	Limiter/Clamper Circuits
G1	Digital Logic Numbering Systems and Functions
G2	Computers
G3	Digital Circuits
G4	Digital to Analog (D/A) and Analog to Digital (A/D) Converters
H1	Connections (Transmission Lines and Waveshaping Circuits)
H2	Microwave Oscillators and Amplifiers
H3	Resonant Cavities
H4	Transmitters and Receivers
H5	Antennas
I1	Radio Frequency Measurements
I2	Radio Frequency Calculations
J1	Microphones and Speakers
J2	Photosensitive Devices
J3	Storage Type Display Tubes
J4	Television, Laser, and Infrared Systems

SURVEY ADMINISTRATION

As mentioned in the PREFACE, data were collected for this survey from over 80 AFSSs (78 AFSSs, 3 Reporting Identifiers). Survey data were collected in four increments, from March 1987 through March 1989. A total of 24,651 EPI booklets were mailed to active duty airmen worldwide. After each of the first three increments, interim survey reports were published by USAFOMC. These reports are all numbered AFPT 90-EPI-825, and are dated July 1988 (EPI-1), January 1989 (EPI-2), and February 1989 (EPI-3). There was no separate report of data collected in EPI-4. Results were combined with those of the first three increments to produce the final reports. There are a total of five final EPI reports, one for each of the following: Chanutte TTC, Keesler TTC, Lowry TTC, Sheppard TTC, and the Air Force Military Training Center (AFMTC) located at Lackland AFB. This report presents results only for DAFSC 30650, Electronic Communications and Cryptographic Equipment Systems Specialist.

Survey administration for 30650 was from September 1987 through April 1988. Of 1,313 DAFSC 30650 personnel assigned, 987 were eligible to take the survey; that is, they had at least 4 weeks' experience in their job, and were not within 90 days of retirement nor expecting reassignment within 60 days. A random sample of 377 was selected, and booklets were mailed to 30650 airmen worldwide. All useable EPI booklets that were returned to USAFOMC were included in the final sample, which numbered 235.

RESULTS

Each completed EPI survey booklet shows which electronic principles the respondent uses in his or her present job. When the responses of all survey respondents from a specific group are combined, the results are shown as percent of group members using each of the 712 EP items. Complete survey results are listed in Appendix A, which shows the percent of sample members responding "Yes" to each of the 712 EPI items.

Collectively, 30650 personnel used 662 of the 712 EPI items. However, the highest number of EPI items used by any 30650 survey respondent was 446, while the person who used the least number of EPI items used only eight. On the average, 30650 sample members used 174 of the 712 EPI items.

Training Analysis

One of the primary reasons for collecting EPI data is to determine the EP training needs of Air Force personnel, and consequently, how well USAF technical training supports those needs. To this end, subject-matter experts (SMEs) matched EPI items to appropriate block(s) of the Electronic Fundamentals/Applications (EF/A) part of the Specialty Training Standard (STS), known as the STS Attachment 2.

For this study, a "generic" version of the EF/A STS was used for the match--that is, all blocks of the EF/A were matched, and the proficiency codes are NOT specific to the 306X0 STS. Still, this match of EPI items to the EF/A STS can be used to determine which blocks of the STS Attachment 2 should be included in the 306X0 STS, and should be reviewed for this purpose. The match of EPI items (with corresponding survey data) to the "generic" EF/A STS is located in Appendix B of this report.

Subject-matter experts also match EPI items to Plans of Instruction (POIs) for Air Force courses which teach electronic principles. Once the EPI items are matched to the appropriate POI block(s), the percent of group members responding "Yes" to those matched items can show how well the particular block of instruction is supported. For example, if many group members respond "Yes" to the EPI items matched to a block of instruction, then that block is considered well supported by survey data. If, however, few group members respond "Yes", this indicates little support for the POI block under consideration.

For this study, SMEs matched the 712 EPI items to the POI for course L3ABR30630, dated 22 September 1986. This match (with 30650 survey data) is shown as Appendix C of this report. The first section shows the EPI items matched to the POI, while the second section shows the EPI items which were not referenced to any POI block.

Most of the POI was supported by survey data. In fact, only one section (Block I, Item 1a) is recommended for review due to low percent members responding "Yes". Furthermore, 69 EPI items not referenced to the POI had at least 30 percent of sample members responding "Yes". Examples of these unreferenced items are included in Table 2, and the complete listing can be found in Appendix C under "TASKS NOT REFERENCED". These 69 items should be considered for inclusion into the EP section of the course.

TABLE 2

EXAMPLE EPI ITEMS NOT REFERENCED TO POI WITH AT LEAST
30 PERCENT OF DAFSC 30650 MEMBERS RESPONDING YES

TASK NUMBER/TASK TITLE	PERCENT MEMBERS RESPONDING "YES"
A5-06 Do you use crimping tool to repair or make connections	88
B4-01 Do you use frequency counters	83
A1-16 Do you troubleshoot circuits to isolate a faulty relay	78
A5-10 Do you repair or fabricate connectors or cables on coaxial cables	72
A5-07 Do you use wire wrap tool to make connections	71
A5-09 Do you repair or fabricate connectors or cables on multiconductor cables	70
F1-03 Do you troubleshoot to isolate a faulty oscillator circuit	65
F1-04 Do you troubleshoot oscillators to circuit level components	59
A1-19 Do you continuity check relays	58
F2-04 Do you troubleshoot multivibrators to circuit level components	56
A1-18 Do you perform tasks on contacts, cores, coils, armatures, or springs	43
A1-25 Do you calibrate or adjust circuits by using variable inductors	43
A1-32 Do you calibrate or adjust circuits using variable capacitors	43
C1-06 Do you adjust or align transistor amplifiers	38
G4-03 Do you troubleshoot A/D converter circuits	36
B3-09 Do you use pattern signal generators	33
G3-23 Do you perform tasks on comparators	32

DISCUSSION

ATC Regulation 52-22 provides direct and specific guidance on the use of occupational survey data in the development of Specialty Training Standards and centralized training programs; however, the guidelines deal with the use of task data, not principles data. Concerning electronic principles, the regulation states only that "EPI studies provide valuable information for curriculum development or validation in terms of percent members requiring a range of electronics principles knowledge in the performance of their job." Though there are no hard and fast rules for using EPI data, training personnel should consider EPI survey results when developing or refining EP training program content.

Following is a summary of the Appendices:

- Appendix A: 30650 EP data in EPI job inventory order
- Appendix B: 30650 EP data matched to Electronic
Fundamentals/Applications (EF/A) STS
- Appendix C: 30650 EP data matched to POI L3ABR30630,
dated 22 September 1986

As mentioned throughout this report, the data contained in these appendices show the use of EP data by 30650 personnel, and consequently provide insight into the EP training needs of airmen in the Electronic Communications and Cryptographic Equipment Systems specialties (AFSC 306X0).

T A B L E O F C O N T E N T S

Page 1

Report	Element	Program	Title	Page
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2.	RP0012	PRTMOD	DAFSC 30650 EPI Data Matched to EF/A STS	30
3.	RP0013	PRTMOD	DAFSC 30650 EPI Data Matched to POI L3ABR30630 002	83

Report Option Table for Modules

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Report Option Table for Tasks

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Description of Reported Module Factors

Col	Factor	Source vector	Title	Number Members	Mean	S.D.	Based on All Tasks Within Range	Max	Min	Valid
1	TITLE		Module Statement							

Description of Reported Task Factors

Col	Factor	Source vector	Title	Number Members	Mean	S.D.	Based on All Tasks Within Range	Max	Min	Valid
1	TITLE		Task Statement							
2	F0083	GP0089/PMF	All DAFSC 30650	235	24.48	25.37	97.45	.00		712

Electronic Principles Inventory (EPI) data for Air Force specialties is presented below in job inventory order. Data for this report was collected from job incumbents during the period September 1987 - April 1988

Percent members responding "YES" is shown for each specialty listed.

For assistance in using this EPI printout phone USAFOMC/OMYA, at AUTOVON 487-6811.

D			
T	Task		306
Y	Nbr	Task Title	50

0001 EPI Electronic Principles Inventory

0002 I. General Electronic/Electricity

0003 I 1. A1 Direct/Alternating Current

A 1	A1-1 Do you use metric terms (example milli, kilo, mega)	73
A 2	A1-2 Do you use basic DC electrical/electronic terms	97
A 3	A1-3 Do you use basic AC electrical/electronic terms	95
A 4	A1-4 Do you trace schematic or block diagrams of circuits containing conductors, fuses, lamps, switches, or batteries	93
A 5	A1-5 Do you troubleshoot circuits containing conductors, fuses, lamps, switches, or batteries	94
A 6	A1-6 Do you calculate values of DC voltage, current, resistance, or power	45
A 7	A1-7 Do you calculate values of AC effective voltage, average voltage, or peak-to-peak voltage	45
A 8	A1-8 Do you calculate values of frequency, phase relationship, or wave length	46
A 9	A1-9 Do you trace schematic or block diagrams of circuits containing resistors	89
A 10	A1-10 Do you troubleshoot circuits to isolate a faulty resistor	84
A 11	A1-11 Do you calibrate or adjust circuits by using variable resistors	83
A 12	A1-12 Do you calculate the value of a resistor required for a circuit	48
A 13	A1-13 Do you determine ohmic value of a resistor using the color code	75
A 14	A1-14 Do you ohm check resistors	83

Task Title	306 50
A 15 Al-15 Do you trace schematic or block diagrams of circuits containing relays	79
A 16 Al-16 Do you troubleshoot circuits to isolate a faulty relay	78
A 17 Al-17 Do you adjust relays	41
A 18 Al-18 Do you perform tasks on contacts, cores, coils, armatures, or springs	43
A 19 Al-19 Do you continuity check relays	58
A 20 Al-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils	67
A 21 Al-21 Do you troubleshoot circuits to isolate a faulty inductor, choke, or choke coil	65
A 22 Al-22 Do you calculate values of circuit total inductance	23
A 23 Al-23 Do you calculate values of circuit or component inductive reactance	21
A 24 Al-24 Do you calculate values of circuit voltage or current in circuits containing inductors	26
A 25 Al-25 Do you calibrate or adjust circuits by using variable inductors	43
A 26 Al-26 Do you ohm check inductors	57
A 27 Al-27 Do you trace schematic or block diagrams of circuits containing capacitors	85
A 28 Al-28 Do you troubleshoot circuits to isolate a faulty capacitor	83
A 29 Al-29 Do you calculate values of circuit total capacitance	31
A 30 Al-30 Do you calculate values of circuit or component capacitive reactance	27
A 31 Al-31 Do you calculate values of circuit or component voltage or current in circuits containing capacitors	31
A 32 Al-32 Do you calibrate or adjust circuits using variable capacitors	43
A 33 Al-33 Do you ohm check capacitors	78
A 34 Al-34 Do you use capacitor color codes in your present job	23
A 35 Al-35 Do you trace schematic or block diagrams of circuits containing transformers	80
A 36 Al-36 Do you troubleshoot circuits to isolate a faulty transformer	77
A 37 Al-37 Do you calculate transformer voltage or current step-up or step-down ratios	35
A 38 Al-38 Do you calculate impedance of transformers	22
A 39 Al-39 Do you calibrate or adjust circuits using variable transformers	25
A 40 Al-40 Do you ohm check transformers	65
A 41 Al-41 Do you measure transformer output voltage	73
A 42 Al-42 Do you trace schematic or block diagrams of circuits containing three phase transformers	29
A 43 Al-43 Do you troubleshoot circuits to isolate a faulty three phase transformer	27
A 44 Al-44 Do you adjust three phase transformers	17

D Task 306
 Y Nbr 50

0004 I 2. A2 Electro/Mechanical Devices

A 45	A2-1 Do you trace schematic or block diagrams of circuits containing DC motors	23
A 46	A2-2 Do you troubleshoot circuits to isolate a faulty DC motor	23
A 47	A2-3 Do you troubleshoot DC motor component parts	13
A 48	A2-4 Do you perform tasks on DC motor component parts	14
A 49	A2-5 Do you trace schematic or block diagrams of circuits containing AC motors	23
A 50	A2-6 Do you troubleshoot circuits to isolate a faulty AC motor	22
A 51	A2-7 Do you troubleshoot AC motor component parts	11
A 52	A2-8 Do you perform tasks on AC motor component parts	14
A 53	A2-9 Do you trace schematic or block diagrams of circuits containing DC generators	4
A 54	A2-10 Do you troubleshoot to isolate a faulty DC generator	4
A 55	A2-11 Do you troubleshoot DC generator component parts	4
A 56	A2-12 Do you perform tasks on component parts of DC generators	4
A 57	A2-13 Do you trace schematic or block diagrams of circuits containing AC generators	4
A 58	A2-14 Do you troubleshoot circuits to isolate a faulty AC generator	4
A 59	A2-15 Do you troubleshoot AC generator component parts	3
A 60	A2-16 Do you perform tasks on component parts of AC generators	3
A 61	A2-17 Do you trace schematic or block diagrams of circuits containing alternators	2
A 62	A2-18 Do you troubleshoot circuits to isolate a faulty alternator	1
A 63	A2-19 Do you troubleshoot alternator component parts	1
A 64	A2-20 Do you perform tasks on component parts of alternators	1
A 65	A2-21 Do you trace schematic or block diagrams of circuits containing synchros or servos	7
A 66	A2-22 Do you troubleshoot circuits to isolate a faulty synchro or servo	7
A 67	A2-23 Do you troubleshoot synchro or servo component parts	6
A 68	A2-24 Do you perform tasks on component parts of synchros or servos	6
A 69	A2-25 Do you trace schematic or block diagrams of circuits containing choppers	2
A 70	A2-26 Do you troubleshoot circuits to isolate a faulty chopper	2
A 71	A2-27 Do you measure chopper coil excitation frequency	1
A 72	A2-28 Do you measure chopper coil voltage-current phase relationship	1

D	T	Task Title	306
Y	Nbr		50
A	73	A2-29 Do you trace schematic or block diagrams of circuits containing transducers	3
A	74	A2-30 Do you troubleshoot circuits to isolate a faulty transducer	4
A	75	A2-31 Do you calibrate or adjust transducers	3
A	76	A2-32 Do you repair, clean or lubricate transducers	3
A	77	A2-33 Do you trace schematic or block diagrams of circuits containing solenoids	7
A	78	A2-34 Do you troubleshoot circuits to isolate a faulty solenoid	7
A	79	A2-35 Do you perform maintenance on solenoid component parts	4
A	80	A2-36 Do you trace schematic or block diagrams of circuits containing meter movements	27
A	81	A2-37 Do you troubleshoot circuits to isolate a faulty meter movement	26
A	82	A2-38 Do you perform maintenance on meter movement mechanical parts	12

0005 I 3. A3 Solid State Circuits and Devices

A	83	A3-1 Do you trace schematic or block diagrams of circuits containing diodes	81
A	84	A3-2 Do you troubleshoot circuits to isolate a faulty diode	80
A	85	A3-3 Do you check diodes using an ohmmeter	78
A	86	A3-4 Do you use diode characteristic curves	16
A	87	A3-5 Do you use diode substitution information	39
A	88	A3-6 Do you use diode color codes	30
A	89	A3-7 Do you trace schematic or block diagrams of circuits containing transistors	85
A	90	A3-8 Do you troubleshoot circuits to isolate a faulty transistor	84
A	91	A3-9 Do you check transistors using an ohmmeter	82
A	92	A3-10 Do you check transistors using transistor testers	50
A	93	A3-11 Do you use transistor characteristic curves	16
A	94	A3-12 Do you use transistor substitution information	40
A	95	A3-13 Do you trace schematic or block diagrams of circuits containing integrated circuits (IC)	74
A	96	A3-14 Do you troubleshoot circuits to isolate a faulty IC	69
A	97	A3-15 Do you use IC substitution information	36
A	98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	54
A	99	A3-17 Do you troubleshoot circuits to isolate a faulty solid-state special purpose device	51
A	100	A3-18 Do you perform tasks on varactors/varicaps	28
A	101	A3-19 Do you perform tasks on tunnel diodes	23
A	102	A3-20 Do you perform tasks on field effect transistors (FET)	36
A	103	A3-21 Do you perform tasks on unijunction transistors (UJT)	45
A	104	A3-22 Do you perform tasks on zener diodes	69

D	T Tsk	Y Nbr	Task Title	306
				50
A	105		A3-23 Do you perform tasks on liquid crystal displays (LCD)	26
A	106		A3-24 Do you perform tasks on pin diodes	17
A	107		A3-25 Do you perform tasks on light emitting diodes (LED)	49
A	108		A3-26 Do you perform tasks on fantail transistors	12
A	109		A3-27 Do you perform tasks on silicon controlled rectifiers (SCR)	49
A	110		A3-28 Do you perform tasks on triacs	9
A	111		A3-29 Do you perform tasks on programmable unijunction transistors (PUT)	7
A	112		A3-30 Do you perform tasks on silicon controlled switches (SCS)	12
A	113		A3-31 Do you perform tasks on silicon unilateral switches (SUS)	6
A	114		A3-32 Do you perform tasks on step recovery diodes (SRD)	7
A	115		A3-33 Do you perform tasks on field effect diodes (FED)	14
A	116		A3-34 Do you perform tasks on DIAC (Bi-directional trigger diode)	6
A	117		A3-35 Do you perform tasks on varistors	51
A	118		A3-36 Do you perform tasks on metal oxide varistors (MOV)	7
A	119		A3-37 Do you perform tasks on schottky diodes	5

0006 I 4. A4 Tubes

A	120		A4-1 Do you trace block diagrams of circuits containing electron tubes	32
A	121		A4-2 Do you trace schematic diagrams of electron tube circuits	31
A	122		A4-3 Do you troubleshoot circuits to isolate a faulty electron tube	31
A	123		A4-4 Do you use electron tube characteristic curves	8
A	124		A4-5 Do you use electron tube substitution manuals or charts	14
A	125		A4-6 Do you perform tasks on diode tubes	21
A	126		A4-7 Do you perform tasks on triode tubes	23
A	127		A4-8 Do you perform tasks on tetrode tubes	22
A	128		A4-9 Do you perform tasks on pentode tubes	21
A	129		A4-10 Do you perform tasks on beam power tubes	3
A	130		A4-11 Do you perform tasks on gas tubes	13
A	131		A4-12 Do you perform tasks on phantastons	2
A	132		A4-13 Do you perform tasks on neon tubes	6
A	133		A4-14 Do you perform tasks on xenon tubes	3
A	134		A4-15 Do you perform tasks on nixie tubes	3
A	135		A4-16 Do you trace block diagrams of circuits containing cathode ray tubes (CRT)	6
A	136		A4-17 Do you trace schematic diagrams of CRT circuits	6
A	137		A4-18 Do you troubleshoot to isolate a faulty CRT	6
A	138		A4-19 Do you adjust or calibrate circuits that control CRT operations	6

D	Tsk	Task Title	306
Y	Nbr		50

A	139	A4-20 Do you perform tasks on electrostatic CRT	4
A	140	A4-21 Do you perform tasks on electromagnetic CRT	2

0007 I 5. A5 Soldering or Solderless Connections

A	141	A5-1 Do you solder or desolder hardware connections	96
A	142	A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc	88
A	143	A5-3 Do you solder or desolder printed circuit board connections	81
A	144	A5-4 Do you solder or desolder multi-layer circuit board connections	25
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0008 II. Test Equipment

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B	158	B1-6 Do you use the multimeter to extend the range of ammeters using external shunts	14
B	159	B1-7 Do you use the multimeter to measure circuit resistance	74
B	160	B1-8 Do you use the multimeter to measure component resistance	85

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0010 II 2. B2 Oscilloscopes

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B 190		B4-6 Do you use capacitance testers	17
B 191		B4-7 Do you use capacitor substitution boxes	5
B 192		B4-8 Do you use DC restorers (CRT rejuvenators)	4
B 193		B4-9 Do you use logic current tracers	6
B 194		B4-10 Do you use tube testers	13
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B 196		B4-12 Do you use logic analyzers	8
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0013		III. Amplifier Circuits	

0014		III 1. Cl Transistor Amplifier Circuits	

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C 203		Cl-5 Do you troubleshoot transistor amplifier distortion	36
C 204		Cl-6 Do you adjust or align transistor amplifiers	38
C 205		Cl-7 Do you measure transistor amplifier voltage, current, or power gain	47
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C 207		Cl-9 Do you work on compound-connected (Darlington Pair) transistor amplifiers	11
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C 209		Cl-11 Do you work on paraphase transistor amplifiers	11
C 210		Cl-12 Do you work on push-pull transistor amplifiers	50
C 211		Cl-13 Do you work on audio transistor amplifiers	50
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C 213		Cl-15 Do you work on IF transistor amplifiers	12
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C 215		Cl-17 Do you work on buffer transistor amplifiers	44
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C 217		Cl-19 Do you work on DC transistor amplifiers (switching applications)	42

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0015 III 2. C2 Transistor Amplifier Stabilization Circuits

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0016 III 3. C3 Coupling Circuits

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0017 III 4. C4 Electron Tube Amplifier Circuits

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C 235	C4-2 Do you trace schematic diagrams of electron tube amplifiers	18
C 236	C4-3 Do you troubleshoot to isolate a faulty electron tube amplifier	18

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C 238	C4-5 Do you troubleshoot electron tube amplifier distortion	11
C 239	C4-6 Do you adjust or align electron tube amplifiers	12
C 240	C4-7 Do you measure electron tube amplifier voltage, current, or power gain	13
C 241	C4-8 Do you calculate values of electron tube amplifier voltage, current, or power gain	7
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C 246	C4-13 Do you perform tasks on common grid electron tube amplifiers	15
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C 251	C5-3 Do you calculate op amp gain	13
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C 253	C5-5 Do you use or apply operational amplifiers for general purpose (inverting or non-inverting)	36
C 254	C5-6 Do you use or apply operational amplifiers as differential/comparators	18
C 255	C5-7 Do you use or apply operational amplifiers for summing	9
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C 257	C5-9 Do you use or apply operational amplifiers as active filters	19
C 258	C5-10 Do you use or apply operational amplifiers as oscillators	30
C 259	C5-11 Do you use or apply operational amplifiers as integrators	13
C 260	C5-12 Do you use or apply operational amplifiers for differentiators	13
C 261	C5-13 Do you use or apply operational amplifiers for power supplies (voltage regulators)	41

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C	262	C5-14 Do you use or apply operational amplifiers as analog/digital (A/D) digital/analog (D/A) converters	37
C	263	C5-15 Do you use or apply operational amplifiers as multivibrators	37
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C	266	C6-2 Do you trace schematic diagrams of magnetic amplifier circuits	4
C	267	C6-3 Do you troubleshoot to isolate a faulty magnetic amplifier	3
C	268	C6-4 Do you troubleshoot magnetic amplifiers to circuit level components	3
C	269	C6-5 Do you adjust magnetic amplifiers or components	2
C	270	C6-6 Do you trace block diagrams of circuits containing saturable reactors	3
C	271	C6-7 Do you trace schematic diagrams of saturable reactor circuits	3
C	272	C6-8 Do you troubleshoot to isolate a faulty saturable reactor	3
C	273	C6-9 Do you troubleshoot saturable reactors to circuit level components	3
C	274	C6-10 Do you adjust saturable reactor circuits or components	2

0020 IV. Power Supplies

0021 IV 1. D1 Power Supply Circuits

D	275	D1-1 Do you trace block diagrams of circuits containing power supplies	86
D	276	D1-2 Do you trace schematic diagrams of power supply circuits	85
D	277	D1-3 Do you troubleshoot circuits to isolate a faulty power supply	88
D	278	D1-4 Do you troubleshoot power supplies to circuit level components	81
D	279	D1-5 Do you align or adjust power supplies	87
D	280	D1-6 Do you perform tasks on half-wave rectifier power supplies	67

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D 281	D1-7 Do you perform tasks on full-wave rectifier power supplies	72
D 282	D1-8 Do you perform tasks on full-wave bridge rectifier power supplies	74
D 283	D1-9 Do you perform tasks on three-phase rectifier power supplies	23
D 284	D1-10 Do you perform tasks on voltage multipliers (doublers/triplers)	40
D 285	D1-11 Do you perform tasks on DC to DC converters	60
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0022	IV 2. D2 Power Supply Filters	
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D 289	D2-2 Do you trace schematic diagrams of power supply filters	67
D 290	D2-3 Do you troubleshoot circuits to isolate a faulty power supply filter	66
D 291	D2-4 Do you troubleshoot power supply filters to circuit level components	58
D 292	D2-5 Do you perform tasks on capacitive power supply filters	60
D 293	D2-6 Do you perform tasks on inductive power supply filters	52
D 294	D2-7 Do you perform tasks on L-type power supply filters	34
D 295	D2-8 Do you perform tasks on Pi-type power supply filters	29
D 296	D2-9 Do you perform tasks on T-type power supply filters	26
D 297	D2-10 Do you perform tasks on resistive capacitive (RC) power supply filters	59
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0023	IV 3. D3 Power Supply Voltage Regulators	
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D 300	D3-2 Do you trace schematic diagrams of power supply voltage regulator circuits	69
D 301	D3-3 Do you troubleshoot circuits to isolate a faulty power supply voltage regulator	68
D 302	D3-4 Do you troubleshoot power supply voltage regulators to circuit level components	65
D 303	D3-5 Do you perform tasks on variable resistor power supply voltage regulators	64

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D 304	D3-6	Do you perform tasks on zener diode power supply voltage regulators	62
D 305	D3-7	Do you perform tasks on transistor series power supply voltage regulators	53
D 306	D3-8	Do you perform tasks on IC power supply voltage regulators	31
D 307	D3-9	Do you perform tasks on pulse width modulator power supply voltage regulators	20
D 308	D3-10	Do you perform tasks on transistor series power supply voltage regulators with current limiting	29
D 309	D3-11	Do you perform tasks on crow bar power supply voltage regulators	10

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0025 V 1. E1 Resistive Capacitive Inductive Circuits

E 310	E1-1	Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	35
E 311	E1-2	Do you troubleshoot RCL circuits to circuit level components	33
E 312	E1-3	Do you trace schematic or block diagrams of circuits containing resonant RCL circuits	31
E 313	E1-4	Do you troubleshoot resonant RCL circuits to circuit level components	31
E 314	E1-5	Do you calculate values of impedance, voltage, or current in RCL circuits	13
E 315	E1-6	Do you calculate phase angle of RCL circuits	9
E 316	E1-7	Do you calculate values of power in RCL circuits	10

0026 V 2. E2 Frequency Sensitive Filters

E 317	E2-1	Do you trace schematic or block diagrams of circuits containing frequency sensitive filters	30
E 318	E2-2	Do you troubleshoot circuits to isolate a faulty frequency sensitive filter	30
E 319	E2-3	Do you troubleshoot frequency sensitive filters to circuit level components	28
E 320	E2-4	Do you align or adjust frequency sensitive filters	23
E 321	E2-5	Do you calculate capacitance or inductance values for specific frequency sensitive filters	11
E 322	E2-6	Do you perform tasks on low pass frequency sensitive filters	31

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E 323	E2-7 Do you perform tasks on high pass frequency sensitive filters	31
E 324	E2-8 Do you perform tasks on band pass frequency sensitive filters	31
E 325	E2-9 Do you perform tasks on band-reject frequency sensitive filters	22
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0027 VI. Waveshaping/Generating Circuits

0028 VI 1. F1 Oscillators

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F 328	F1-2 Do you trace schematic diagrams of oscillator circuits	66
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F 330	F1-4 Do you troubleshoot oscillators to circuit level components	59
F 331	F1-5 Do you align or adjust oscillator circuits	62
F 332	F1-6 Do the oscillators you work with use LC tank circuits	42
F 333	F1-7 Do the oscillators you work with use RC networks	40
F 334	F1-8 Do the oscillators you work with use crystals	65
F 335	F1-9 Do the oscillators you work with use phase lock loops (PLL)	17
F 336	F1-10 Do you perform tasks on series Hartley oscillator circuits	29
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F 338	F1-12 Do you perform tasks on Colpitts oscillator circuits	26
F 339	F1-13 Do you perform tasks on Clapp oscillator circuits	11
F 340	F1-14 Do you perform tasks on voltage control oscillators (VCO/VTD)	17
F 341	F1-15 Do you perform tasks on crystal oscillator circuits	60
F 342	F1-16 Do you perform tasks on Wien bridge oscillator circuits	7
F 343	F1-17 Do you perform tasks on pulse generating oscillator circuits	22
F 344	F1-18 Do you perform tasks on blocked/blocking oscillator circuits	6
F 345	F1-19 Do you perform tasks on burst generators	6
F 346	F1-20 Do you perform tasks on RC phase shift oscillators	16

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0029 VI 2. F2 Multivibrators

F 347	F2-1 Do you trace block diagrams of circuits containing multivibrators	64
F 348	F2-2 Do you trace schematic diagrams of multivibrator circuits	63
F 349	F2-3 Do you troubleshoot to isolate a faulty multivibrator circuit	62
F 350	F2-4 Do you troubleshoot multivibrators to circuit level components	56
F 351	F2-5 Do you adjust or align multivibrator circuits	33
F 352	F2-6 Do the multivibrators you work with use LC tank circuits	40
F 353	F2-7 Do the multivibrators you work with use RC networks	43
F 354	F2-8 Do the multivibrators you work with use Crystals	45
F 355	F2-9 Do you perform tasks on astable (free running) multivibrators	58
F 356	F2-10 Do you perform tasks on monostable (one shot) multivibrators	63
F 357	F2-11 Do you perform tasks on bistable (flip flop) multivibrators	65
F 358	F2-12 Do you perform tasks on triggered astable multivibrators	46

0030 VI 3. F3 Waveshaping Circuits

F 359	F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	47
F 360	F3-2 Do you trace schematic diagrams of WSC	46
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F 363	F3-5 Do you adjust or calibrate WSC	32
F 364	F3-6 Do you perform tasks on sawtooth wave generator WSC	39
F 365	F3-7 Do you perform tasks on trapezoidal (ramp) wave generator WSC	11
F 366	F3-8 Do you perform tasks on RC differentiating WSC	24
F 367	F3-9 Do you perform tasks on RL differentiating WSC	21
F 368	F3-10 Do you perform tasks on RC integrating WSC	21
F 369	F3-11 Do you perform tasks on RL integrating WSC	20
F 370	F3-12 Do you perform tasks on square wave generator WSC	44
F 371	F3-13 Do you perform tasks on rectangular wave generator WSC	22
F 372	F3-14 Do you perform tasks on Schmitt trigger WSC	46

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0031 VI 4. F4 Limiter/Clamper Circuits

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F 374	F4-2 Do you trace schematic diagrams of limiter circuits	43
F 375	F4-3 Do you trace block diagrams of circuits containing clampers	39
F 376	F4-4 Do you trace schematic diagrams of clamper circuits	37
F 377	F4-5 Do you troubleshoot to isolate a faulty limiter circuit	40
F 378	F4-6 Do you troubleshoot limiters to circuit level components	37
F 379	F4-7 Do you troubleshoot to isolate a faulty clamper circuit	35
F 380	F4-8 Do you troubleshoot clampers to circuit level components	33
F 381	F4-9 Do you perform tasks on series diode limiter circuits	38
F 382	F4-10 Do you perform tasks on shunt diode limiter circuits	36
F 383	F4-11 Do you perform tasks on bias limiter circuits	22
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F 385	F4-13 Do you perform tasks on transistor limiter circuits	30
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F 387	F4-15 Do you perform tasks on diode clamper circuits	35
F 388	F4-16 Do you perform tasks on bias clamper circuits	22

0032 VII. Computers, Digital Circuits, and Devices-----
0033 VII 1. G1 Digital Logic Numbering Systems and Functions

G 389	G1-1 Do you convert decimal numbers to binary numbers or binary numbers to decimal	22
G 390	G1-2 Do you convert octal numbers to binary or binary numbers to octal	12
G 391	G1-3 Do you convert hexadecimal numbers to binary or binary numbers to hexadecimal	19
G 392	G1-4 Do you convert octal numbers to decimal or decimal numbers to octal	10
G 393	G1-5 Do you convert hexadecimal numbers to decimal or decimal numbers to hexadecimal	19
G 394	G1-6 Do you convert octal numbers to hexadecimal or hexadecimal numbers to octal	11
G 395	G1-7 Do you convert base number fractions to another base numbering system	9
G 396	G1-8 Do you add binary numbers	20

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G 398	12	G1-10 Do you multiply binary numbers	12
G 399	11	G1-11 Do you divide binary numbers	11
G 400	9	G1-12 Do you add octal numbers	9
G 401	9	G1-13 Do you subtract octal numbers	9
G 402	14	G1-14 Do you add hexadecimal numbers	14
G 403	13	G1-15 Do you subtract hexadecimal numbers	13
G 404	14	G1-16 Do you use binary coded decimal (BCD)	14
G 405	2	G1-17 Do you use gray codes	2
G 406	1	G1-18 Do you use ICAO codes	1
G 407	1	G1-19 Do you use excess-3 (XS3) codes	1
G 408	12	G1-20 Do you use parity bit codes	12
G 409	2	G1-21 Do you use biquinary codes	2
G 410	20	G1-22 Do you use ASCII codes	20
G 411	3	G1-23 Do you use EBCDI codes	3
G 412	57	G1-24 Do you trace data flow through logic symbol diagrams	57
G 413	57	G1-25 Do you trace data flow through logic schematic diagrams	57
G 414	55	G1-26 Do you troubleshoot digital systems to major units	55
G 415	57	G1-27 Do you troubleshoot digital systems subassemblies or circuit cards	57
G 416	48	G1-28 Do you troubleshoot digital systems, subsystems or circuit cards to circuit level components or IC	48
G 417	49	G1-29 Do you trace data flow through circuits using positive logic (High = Binary 1)	49
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G 419	63	G1-31 Do you perform tasks related to AND gates	63
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G 425	43	G1-37 Do you perform tasks related to D(Data) flip flops	43
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G 427	27	G1-39 Do you perform tasks related to JK flip flops	27
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G 435	G1-47 Do you develop Boolean equations from logic circuits or diagrams	17
G 436	G1-48 Do you develop logic diagrams from Boolean equations	17
G 437	G1-49 Do you simplify Boolean expressions using Boolean algebra	18
G 438	G1-50 Do you perform tasks on RTL (resistor transistor logic formally DCTL)	16
G 439	G1-51 Do you perform tasks on DTL (diode transistor logic)	21
G 440	G1-52 Do you perform tasks on TTL (transistor transistor logic)	26
G 441	G1-53 Do you perform tasks on ECL/CML (emitter coupled or current mode logic)	7
G 442	G1-54 Do you perform tasks on HTL (high threshold logic)	6
G 443	G1-55 Do you perform tasks on CMOS (complementary metal oxide semiconductor)	21
G 444	G1-56 Do you perform tasks on positive MOS ICs	10
G 445	G1-57 Do you perform tasks on negative MOS ICs	9
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0034 VII 2. G2 Computers

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G 449	G2-3 Do you write or debug programs	6
G 450	G2-4 Do you troubleshoot computers to a major unit	14
G 451	G2-5 Do you troubleshoot computers to a subassembly or circuit card	14
G 452	G2-6 Do you troubleshoot computer subassembly or circuit card to circuit level components or IC	6
G 453	G2-7 Do you use computer flow charts or diagrams	11
G 454	G2-8 Do you perform tasks on analog computers	7
G 455	G2-9 Do you perform tasks on digital computers	18
G 456	G2-10 Do you use Basic computer language	9
G 457	G2-11 Do you use COBOL computer language	2
G 458	G2-12 Do you use FORTRAN computer language	0
G 459	G2-13 Do you use ADA computer language	1
G 460	G2-14 Do you use ATLAS computer language	0
G 461	G2-15 Do you use ELAN computer language	0
G 462	G2-16 Do you use PASCAL computer language	1
G 463	G2-17 Do you use RPG computer language	0
G 464	G2-18 Do you use Machine computer language	5
G 465	G2-19 Do you use C computer language	0
G 466	G2-20 Do you perform tasks on magnetic (tape, disc, core) computer memories	15
G 467	G2-21 Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories	14

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G 468	G2-22 Do you perform tasks on paper (tape, punch card) computer memories	2
G 469	G2-23 Do you perform tasks on advanced technology (bubble, CCD, electron beam, laser, thin film) computer memories	2
G 470	G2-24 Do you perform tasks on computer keyboards	17
G 471	G2-25 Do you perform tasks on computer character printers	11
G 472	G2-26 Do you perform tasks on magnetic tape drives	9
G 473	G2-27 Do you perform tasks on microprocessor computer terminals	9
G 474	G2-28 Do you perform tasks on video display unit (VDU/monitors)	11
G 475	G2-29 Do you perform tasks on paper tape readers/punches	4
G 476	G2-30 Do you perform tasks on paper card readers/punches	1
G 477	G2-31 Do you perform tasks on toggle or push button switch inputs	8
G 478	G2-32 Do you perform tasks on incandescent displays (Nixie tubes, LEDs, LCDs)	7
G 479	G2-33 Do you perform tasks on modems	26
G 480	G2-34 Do you perform tasks on line printers	9
G 481	G2-35 Do you perform tasks on floppy disc drives	9
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G 483	G2-37 Do you perform tasks on removable pack disc drives	3
G 484	G2-38 Do you perform tasks on fixed Winchester type disc drives	3
G 485	G2-39 Do you trace block or schematic diagrams of microprocessor controlled systems	9
G 486	G2-40 Do you troubleshoot microprocessor controlled systems to a subassembly or circuit card	10
G 487	G2-41 Do you troubleshoot microprocessor controlled systems to isolate a faulty microprocessor	6

0035	VII 3. G3 Digital Circuits	
G 488	G3-1 Do you trace data flow through circuits containing counters	54
G 489	G3-2 Do you troubleshoot counter circuits to isolate a faulty counter	53
G 490	G3-3 Do you troubleshoot counters to circuit level components	50
G 491	G3-4 Do you perform tasks on UP counters in logic circuits	43
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G 494	G3-7 Do you perform tasks on ring counters in logic circuits	26

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G 495	G3-8 Do you perform tasks on modulus counters in logic circuits	20
G 496	G3-9 Do you perform tasks on synchronous (parallel) counters in logic circuits	47
G 497	G3-10 Do you perform tasks on asynchronous (serial) counters in logic circuits	46
G 498	G3-11 Do you trace logic diagrams of circuits containing registers	49
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G 500	G3-13 Do you troubleshoot registers to circuit level components	43
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G 507	G3-20 Do you perform tasks on decoders	42
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G 509	G3-22 Do you perform tasks on demultiplexers	24
G 510	G3-23 Do you perform tasks on comparators	32
G 511	G3-24 Do you perform tasks on parity generators or checkers	20
G 512	G3-25 Do you perform tasks on code converters	17
G 513	G3-26 Do you perform tasks on adders	38
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G 518	G4-3 Do you troubleshoot A/D converter circuits	36
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G 521	G4-6 Do the converters you perform tasks on use successive approximation conversion	8
G 522	G4-7 Do the converters you perform tasks on use ramp conversion	3
G 523	G4-8 Do the converters you perform tasks on use R2R conversion	3

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0037 VIII. Transmission/Reception Circuits, Devices, and Systems

0038 VIII 1. H1 Connections

H 524	H1-1 Do you measure electrical length on transmission lines	6
H 525	H1-2 Do you measure physical length on transmission lines	8
H 526	H1-3 Do you measure standing wave ratio (SWR) on transmission lines	5
H 527	H1-4 Do you construct transmission lines	9
H 528	H1-5 Do you match transmission line impedance with loads	17
H 529	H1-6 Do you calculate the characteristic impedance (Z0) of transmission lines	6
H 530	H1-7 Do you troubleshoot transmission lines	25
H 531	H1-8 Do you perform tasks on open-wire transmission lines	13
H 532	H1-9 Do you perform tasks on twisted pair transmission lines	26
H 533	H1-10 Do you perform tasks on twin lead transmission lines	15
H 534	H1-11 Do you perform tasks on flexible coaxial transmission lines	14
H 535	H1-12 Do you perform tasks on rigid coaxial transmission lines	8
H 536	H1-13 Do you perform tasks on fiber-optic transmission lines	9
H 537	H1-14 Do you trace schematic or block diagrams of circuits containing waveguides	1
H 538	H1-15 Do you troubleshoot circuits to isolate a faulty waveguide assembly	1
H 539	H1-16 Do you pressurize or purge waveguide assemblies	1
H 540	H1-17 Do you measure standing wave ratio for waveguide assemblies	1
H 541	H1-18 Do you remove or install waveguide or associated coupling hardware components	1

0039 VIII 2. H2 Microwave Oscillators and Amplifiers

H 542	H2-1 Do you trace schematic or block diagrams of circuits containing microwave oscillators or amplifiers	1
H 543	H2-2 Do you troubleshoot circuits to isolate a faulty microwave oscillator or amplifier	1
H 544	H2-3 Do you tune or adjust microwave oscillators or amplifiers	0
H 545	H2-4 Do you perform tasks on two-cavity klystron microwave oscillators and amplifiers	0

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H 546			H2-5 Do you perform tasks on three-cavity klystron microwave oscillators and amplifiers	0
H 547			H2-6 Do you perform tasks on reflex klystron microwave oscillators and amplifiers	0
H 548			H2-7 Do you perform tasks on traveling wave tube microwave oscillators and amplifiers	0
H 549			H2-8 Do you perform tasks on magnetron microwave oscillators and amplifiers	0
H 550			H2-9 Do you perform tasks on backward wave oscillator	0
H 551			H2-10 Do you perform tasks on parametric amplifiers	0
H 552			H2-11 Do you perform tasks on yttrium iron garnet (YIG) tuned microwave oscillators and amplifiers	0

0040	VIII 3. H3 Resonant Cavities			

H 553			H3-1 Do you trace schematic or block diagrams of circuits containing resonant cavities	1
H 554			H3-2 Do you troubleshoot circuits to isolate a faulty resonant cavity	1
H 555			H3-3 Do you tune or adjust resonant cavities electrically	1
H 556			H3-4 Do you tune or adjust resonant cavities physically	1
H 557			H3-5 Do you measure frequency of resonant cavities	1
H 558			H3-6 Do you perform tasks on probe resonant cavities	0
H 559			H3-7 Do you perform tasks on loop resonant cavities	0
H 560			H3-8 Do you perform tasks on aperture (iris/window) resonant cavities	0

0041	VIII 4. H4 Transmitters and Receivers			

H 561			H4-1 Do you use "AM" modulation principles	3
H 562			H4-2 Do you trace block diagrams of AM transmitters	3
H 563			H4-3 Do you trace block diagrams of AM transmitter subassemblies or circuit cards	3
H 564			H4-4 Do you trace schematic diagrams of AM transmitter subassemblies or circuit cards	3
H 565			H4-5 Do you troubleshoot AM transmitters to major units	3
H 566			H4-6 Do you troubleshoot AM transmitters to subassemblies or circuit cards	3
H 567			H4-7 Do you troubleshoot AM transmitter subassemblies or circuit cards to circuit level components	2
H 568			H4-8 Do you align or adjust AM transmitters or circuits	3
H 569			H4-9 Do you calculate percentage of modulation for AM transmitters	1
H 570			H4-10 Do you use "AM" demodulation principles	2
H 571			H4-11 Do you trace block diagrams of AM receivers	2

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H 572	H4-12 Do you trace block diagrams of AM receiver subassemblies or circuit cards	2
H 573	H4-13 Do you trace schematic diagrams of AM receiver subassemblies or circuit cards	2
H 574	H4-14 Do you troubleshoot AM receivers to major units	2
H 575	H4-15 Do you troubleshoot AM receivers to subassemblies or circuit cards	2
H 576	H4-16 Do you troubleshoot AM receiver subassemblies or circuit cards to circuit level components	1
H 577	H4-17 Do you align or adjust AM receivers or circuits	2
H 578	H4-18 Do you trace block diagrams of single side band (SSB) transmitters	2
H 579	H4-19 Do you trace block diagrams of SSB transmitter subassemblies or circuit cards	1
H 580	H4-20 Do you trace schematic diagrams of SSB transmitter subassemblies or circuit cards	1
H 581	H4-21 Do you troubleshoot SSB transmitters to major units	2
H 582	H4-22 Do you troubleshoot SSB transmitters to subassemblies or circuit cards	1
H 583	H4-23 Do you troubleshoot SSB transmitter subassemblies or circuit cards to circuit level components	1
H 584	H4-24 Do you align or adjust SSB transmitters or circuits	1
H 585	H4-25 Do you calculate percentage of modulation for SSB transmitters	0
H 586	H4-26 Do you trace block diagrams of SSB receivers	2
H 587	H4-27 Do you trace block diagrams of SSB receiver subassemblies or circuit cards	1
H 588	H4-28 Do you trace schematic diagrams of SSB receiver subassemblies or circuit cards	1
H 589	H4-29 Do you troubleshoot SSB receivers to major units	2
H 590	H4-30 Do you troubleshoot SSB receivers to sub-assemblies or circuit cards	1
H 591	H4-31 Do you troubleshoot SSB receiver subassemblies or circuit cards to circuit level components	1
H 592	H4-32 Do you align or adjust SSB receivers or circuits	1
H 593	H4-33 Do you use "FM" modulation principles	4
H 594	H4-34 Do you trace block diagrams of FM transmitters	4
H 595	H4-35 Do you trace block diagrams of FM transmitter subassemblies or circuit cards	3
H 596	H4-36 Do you trace schematic diagrams of FM transmitter subassemblies or circuit cards	3
H 597	H4-37 Do you troubleshoot FM transmitters to major units	3
H 598	H4-38 Do you troubleshoot FM transmitters to sub-assemblies or circuit cards	3
H 599	H4-39 Do you troubleshoot FM transmitter subassemblies or circuit cards to circuit level components	2
H 600	H4-40 Do you align or adjust FM transmitters or circuits	3
H 601	H4-41 Do you calculate modulation index for FM transmitters	1
H 602	H4-42 Do you measure frequency deviation for FM transmitters	2
H 603	H4-43 Do you use "FM" demodulation principles	3

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H 604	H4-44 Do you trace block diagrams of FM receivers	3
H 605	H4-45 Do you trace block diagrams of FM receiver subassemblies or circuit cards	2
H 606	H4-46 Do you trace schematic diagrams of FM receiver subassemblies or circuit cards	2
H 607	H4-47 Do you troubleshoot FM receivers to major units	2
H 608	H4-48 Do you troubleshoot FM receivers to subassemblies or circuit cards	2
H 609	H4-49 Do you troubleshoot FM receiver subassemblies or circuit cards to circuit level components	1
H 610	H4-50 Do you align or adjust FM receivers or circuits	2
H 611	H4-51 Do you plot receiver signal level curves (RSL) for FM receivers	0
H 612	H4-52 Do you use "PM" modulation principles	2
H 613	H4-53 Do you trace block diagrams of PM transmitters	2
H 614	H4-54 Do you trace block diagrams of PM transmitter subassemblies or circuit cards	2
H 615	H4-55 Do you trace schematic diagrams of PM transmitter subassemblies or circuit cards	2
H 616	H4-56 Do you troubleshoot PM transmitters to major units	2
H 617	H4-57 Do you troubleshoot PM transmitters to subassemblies or circuit cards	2
H 618	H4-58 Do you troubleshoot PM transmitter subassemblies or circuit cards to circuit level components	2
H 619	H4-59 Do you align or adjust PM transmitters or circuits	2
H 620	H4-60 Do you calculate pulse recurrence time (PRT) or pulse recurrence frequency (PRF) for PM transmitters	0
H 621	H4-61 Do you measure PRT, PRF or pulse width for PM transmitters	1
H 622	H4-62 Do you use "PM" demodulation principles	2
H 623	H4-63 Do you trace block diagrams of PM receivers	2
H 624	H4-64 Do you trace block diagrams of PM receiver subassemblies or circuit cards	2
H 625	H4-65 Do you trace schematic diagrams of PM receiver subassemblies or circuit cards	2
H 626	H4-66 Do you troubleshoot PM receivers to major units	2
H 627	H4-67 Do you troubleshoot PM receivers to subassemblies or circuit cards	2
H 628	H4-68 Do you troubleshoot PM receiver subassemblies or circuit cards to circuit level components	1
H 629	H4-69 Do you align or adjust PM receivers or circuits	2

0042 VIII 5. H5 Antennas

H 630	H5-1 Do you physically align antennas	6
H 631	H5-2 Do you electrically align antennas	3
H 632	H5-3 Do you troubleshoot loading of antennas	2
H 633	H5-4 Do you troubleshoot coupling of antennas	3

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	H 634		H5-5 Do you plot graph radiation patterns	1	
	H 635		H5-6 Do you troubleshoot antenna components	3	
	H 636		H5-7 Do you measure standing wave ratio (SWR) for antennas	1	
	H 637		H5-8 Do you work with Vagi antennas	1	
	H 638		H5-9 Do you work with dipole antennas	3	
	H 639		H5-10 Do you work with slotted antennas	1	
	H 640		H5-11 Do you work with rotary antennas	2	
	H 641		H5-12 Do you work with hertz antennas	0	
	H 642		H5-13 Do you work with marconi antennas	0	
	H 643		H5-14 Do you work with rhombic antennas	0	
	H 644		H5-15 Do you work with scimitar antennas	0	
	H 645		H5-16 Do you work with parabolic antennas	1	
	H 646		H5-17 Do you work with ground plane antennas	1	
	H 647		H5-18 Do you perform tasks on rotary antenna arrays	1	
	H 648		H5-19 Do you perform tasks on stacked (end fire) antenna arrays	0	
	H 649		H5-20 Do you perform tasks on broadside antenna arrays	1	
	H 650		H5-21 Do you perform tasks on cardioid antenna arrays	1	
	H 651		H5-22 Do you perform tasks on collinear antenna arrays	0	
	H 652		H5-23 Do you perform tasks on phase antenna arrays	1	
	H 653		H5-24 Do you perform tasks on planar antenna arrays	0	
	H 654		H5-25 Do you perform tasks on antennas with vertical polarization	2	
	H 655		H5-26 Do you perform tasks on antennas with horizontal polarization	2	
	H 656		H5-27 Do you perform tasks on antennas with circular polarization	1	
	H 657		H5-28 Do you perform tasks on antennas with unidirectional radiation patterns	3	
	H 658		H5-29 Do you perform tasks on antennas with bidirectional radiation patterns	3	
	H 659		H5-30 Do you perform tasks on antennas with omnidirectional radiation patterns	3	

0043 IX. Radio Frequency (RF) Measurements or Calculations

0044 IX 1. I1 RF Measurements

I 660	I1-1 Do you measure RF power	3
I 661	I1-2 Do you measure RF peak power	2
I 662	I1-3 Do you measure RF average power	2
I 663	I1-4 Do you measure RF effective power	1
I 664	I1-5 Do you measure RF output power using wattmeters	2

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0045 IX 2. I2 RF Calculations

I 665	I2-1 Do you calculate RF apparent power	1
I 666	I2-2 Do you calculate RF true power	1
I 667	I2-3 Do you calculate RF power loss or gain in db	3

0046 X. Additional Circuits, Devices, Systems, or Items

0047 X 1. J1 Microphones and Speakers

J 668	J1-1 Do you trace block diagrams of circuits containing microphones	19
J 669	J1-2 Do you trace schematic diagrams of microphone circuits	18
J 670	J1-3 Do you troubleshoot to isolate a faulty microphone	21
J 671	J1-4 Do you troubleshoot microphones	11
J 672	J1-5 Do you work on carbon microphones	17
J 673	J1-6 Do you work on capacitor microphones	4
J 674	J1-7 Do you work on crystal microphones	5
J 675	J1-8 Do you work on dynamic microphones	12
J 676	J1-9 Do you work on velocity ribbon microphones	3
J 677	J1-10 Do you trace block diagrams of circuits containing speakers	20
J 678	J1-11 Do you trace schematic diagrams of speaker circuits	18
J 679	J1-12 Do you troubleshoot to isolate a faulty speaker	19
J 680	J1-13 Do you troubleshoot speakers	10

0048 X 2. J2 Photosensitive Devices

J 681	J2-1 Do you trace block diagrams of circuits containing photosensitive devices	3
J 682	J2-2 Do you trace schematic diagrams of photosensitive device circuits	3
J 683	J2-3 Do you troubleshoot to isolate a faulty photosensitive device	3
J 684	J2-4 Do you adjust or calibrate photosensitive devices	1
J 685	J2-5 Do you work on photodiodes	3
J 686	J2-6 Do you work on phototransistors	2
J 687	J2-7 Do you work on phototubes	0
J 688	J2-8 Do you work on photo-SCRs	0

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J 689 J2-9 Do you work on photocells (Photoconductive or Photovoltaic) 1

 0049 X 3. J3 Storage Type Display Tubes

J 690 J3-1 Do you trace block diagrams of circuits containing display tubes 0
 J 691 J3-2 Do you trace schematic diagrams of display tubes or circuits 0
 J 692 J3-3 Do you troubleshoot to isolate a faulty display tube 0
 J 693 J3-4 Do you adjust or calibrate display tubes or circuits 0
 J 694 J3-5 Do you work on direct view storage tubes (DVST) 0
 J 695 J3-6 Do you work on multiple mode storage tubes (MMST) 0
 J 696 J3-7 Do you work on scan converter tubes (SCT) 0

 0050 X 4. J4 Television, Laser, and Infrared Systems

J 697 J4-1 Do you trace block diagrams of TV systems or subassemblies 0
 J 698 J4-2 Do you trace schematic diagrams of TV systems or component circuits 0
 J 699 J4-3 Do you troubleshoot TV systems to major subassemblies 0
 J 700 J4-4 Do you troubleshoot TV systems to circuit level components 0
 J 701 J4-5 Do you adjust or calibrate TV systems or components 0
 J 702 J4-6 Do you trace block diagrams of laser systems or subassemblies 0
 J 703 J4-7 Do you trace schematic diagrams of laser systems or component circuits 0
 J 704 J4-8 Do you troubleshoot laser systems to major subassemblies 0
 J 705 J4-9 Do you troubleshoot laser systems to circuit level components 0
 J 706 J4-10 Do you adjust or calibrate laser systems or components 0
 J 707 J4-11 Do you trace block diagrams of infrared systems or subassemblies 1
 J 708 J4-12 Do you trace schematic diagrams of infrared systems or component circuits 0
 J 709 J4-13 Do you troubleshoot infrared systems to major subassemblies 0
 J 710 J4-14 Do you troubleshoot infrared systems circuit level components 0

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J 711		J4-15 Do you inspect, clean, or service infrared systems or components	1	306 50
J 712		J4-16 Do you adjust or calibrate infrared systems or components	0	

0051 Tasks not referenced

Report Option Table for Modules

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Report Option Table for Tasks

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Description of Reported Module Factors

Col	Factor	Source vector	Title	Number Members	Mean	S.D.	Based on All Tasks Within Range	Min	Max	Valid
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1 TITLE Module Statement

Description of Reported Task Factors

Col	Factor	Source vector	Title	Number Members	Mean	S.D.	Based on All Tasks Within Range	Min	Max	Valid
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1 TITLE Task Statement
 2 F0083 GP0089/PHP All DAFSC 30650

235 24.48 25.37 97.45 .00 712

Electronic Principles Inventory (EPI) data for Air Force specialties is presented below in Electronic Fundamentals/Applications order. Data for this report was collected from job incumbents during the period September 1987 - April 1988

Percent members responding "YES" is shown for each specialty listed.

For assistance in using this EPI printout phone USAFOMC/OMYA,
at AUTOVON 487-6811.

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0001 STS 1 Electronic Fundamentals/
Applications dated 20 Feb 1987

0002 1. Basic Terms

0003 1a. Metric Notation

A 1 A1-1 Do you use metric terms (example milí, kilo, mega) 73

0004 1b. DC Terms

A 2 A1-2 Do you use basic DC electrical/electronic terms 97

0005 1c. AC Terms

A 3 A1-3 Do you use basic AC electrical/electronic terms 95

0006 2. Basic Circuits

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0007	2a.	Theory of operation	B		

A 4	Al-4	Do you trace schematic or block diagrams of circuits containing conductors, fuses, lamps, switches, or batteries		93	

0008	2b.	Troubleshoot circuits	2b		

A 5	Al-5	Do you troubleshoot circuits containing conductors, fuses, lamps, switches, or batteries		94	

0009	3.	Basic Circuit Calculations			

0010	3a.	DC	B		

A 6	Al-6	Do you calculate values of DC voltage, current, resistance, or power		45	
A 12	Al-12	Do you calculate the value of a resistor required for a circuit		48	

0011	3b.	AC	B		

A 7	Al-7	Do you calculate values of AC effective voltage, average voltage, or peak-to-peak voltage		45	
A 8	Al-8	Do you calculate values of frequency, phase relationship, or wave length		46	

0012	4.	Resistors			

0013	4a.	Theory of operation	B		

A 9	Al-9	Do you trace schematic or block diagrams of circuits containing resistors		89	

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A 11 A1-11 Do you calibrate or adjust circuits by using variable resistors 83

0014 4b. Isolate faulty resistors 2b

A 10 A1-10 Do you troubleshoot circuits to isolate a faulty resistor 84

A 14 A1-14 Do you ohm check resistors 83

0015 4c. Color code B

A 13 A1-13 Do you determine ohmic value of a resistor using the color code 75

0016 5. Relays/Solenoids

0017 5a. Relay theory of operation B

A 15 A1-15 Do you trace schematic or block diagrams of circuits containing relays 79

A 17 A1-17 Do you adjust relays 41

A 18 A1-18 Do you perform tasks on contacts, cores, coils, armatures, or springs 43

0018 5b. Isolate faulty relays 2b

A 16 A1-16 Do you troubleshoot circuits to isolate a faulty relay 78

A 19 A1-19 Do you continuity check relays 58

0019 5c. Solenoid theory of operation -

A 77 A2-33 Do you trace schematic or block diagrams of circuits containing solenoids 7

A 79 A2-35 Do you perform maintenance on solenoid component parts 4

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0020 5d. Isolate faulty solenoids -----

A 78 A2-34 Do you troubleshoot circuits to isolate a faulty solenoid 7

0021 6. Inductors ----------
0022 6a. Theory of operation B -----A 20 A1-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils 67
A 25 A1-25 Do you calibrate or adjust circuits by using variable inductors 43-----
0023 6b. Isolate faulty inductors 2b -----A 21 A1-21 Do you troubleshoot circuits to isolate a faulty inductor, choke, or choke coil 65
A 26 A1-26 Do you ohm check inductors 57-----
0024 6c. Calculations B -----A 22 A1-22 Do you calculate values of circuit total inductance 23
A 23 A1-23 Do you calculate values of circuit or component inductive reactance 21
A 24 A1-24 Do you calculate values of circuit voltage or current in circuits containing inductors 26-----
0025 7. Capacitors -----

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0026 7a. Theory of operation B

A	27	Al-27 Do you trace schematic or block diagrams of circuits containing capacitors	85
A	32	Al-32 Do you calibrate or adjust circuits using variable capacitors	43

0027 7b. Isolate faulty capacitors 2b

A	28	Al-28 Do you troubleshoot circuits to isolate a faulty capacitor	83
A	33	Al-33 Do you ohm check capacitors	78

0028 7c. Calculations

A	29	Al-29 Do you calculate values of circuit total capacitance	31
A	30	Al-30 Do you calculate values of circuit or component capacitive reactance	27
A	31	Al-31 Do you calculate values of circuit or component voltage or current in circuits containing capacitors	31

0029 7d. Color code B

A	34	Al-34 Do you use capacitor color codes in your present job	23
---	----	--	----

0030 8. Transformers

0031 8a. Theory of operation B

A	35	Al-35 Do you trace schematic or block diagrams of circuits containing transformers	80
A	39	Al-39 Do you calibrate or adjust circuits using variable transformers	25

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0032 8b. Isolate faulty transformers 2b

- A 36 A1-36 Do you troubleshoot circuits to isolate a faulty transformer 77
 A 40 A1-40 Do you ohm check transformers 65
 A 41 A1-41 Do you measure transformer output voltage 73

0033 8c. Calculations

- A 37 A1-37 Do you calculate transformer voltage or current step-up or step-down ratios 35
 A 38 A1-38 Do you calculate impedance of transformers 22

0034 9. Three Phase Transformers

0035 9a. Theory of operation B

- A 42 A1-42 Do you trace schematic or block diagrams of circuits containing three phase transformers 29
 A 44 A1-44 Do you adjust three phase transformers 17

0036 9b. Isolate faulty three phase transformers

- A 43 A1-43 Do you troubleshoot circuits to isolate a faulty three phase transformer 27

0037 10. DC Motors

0038 10a. Theory of operation B

- A 45 A2-1 Do you trace schematic or block diagrams of circuits containing DC motors 23

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A 48 A2-4 Do you perform tasks on DC motor component parts 14

0039 10b. Isolate faulty DC motors 2b

A 46 A2-2 Do you troubleshoot circuits to isolate a faulty DC motor 23

0040 10c. Troubleshoot motors 2b

A 47 A2-3 Do you troubleshoot DC motor component parts 13

0041 11. AC Motors

0042 11a. Theory of operation B

A 49 A2-5 Do you trace schematic or block diagrams of circuits containing AC motors 23

A 52 A2-8 Do you perform tasks on AC motor component parts 14

0043 11b. Isolate faulty AC motors 2b

A 50 A2-6 Do you troubleshoot circuits to isolate a faulty AC motor 22

0044 11c. Troubleshoot motors 2b

A 51 A2-7 Do you troubleshoot AC motor component parts 11

0045 12. DC Generators

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0046 12a. Theory of operation

A 53 A2-9 Do you trace schematic or block diagrams of circuits 4

A 56 A2-12 Do you perform tasks on component parts of DC generators 4

0047 12b. Isolate faulty DC generators

A 54 A2-10 Do you troubleshoot to isolate a faulty DC generator 4

0048 12c. Troubleshoot DC generators

A 55 A2-11 Do you troubleshoot DC generator component parts 4

0049 13. AC Generators

0050 13a. Theory of operation

A 57 A2-13 Do you trace schematic or block diagrams of circuits containing AC generators 4

A 60 A2-16 Do you perform tasks on component parts of AC generators 3

0051 13b. Isolate faulty AC generators

A 58 A2-14 Do you troubleshoot circuits to isolate a faulty AC generator 4

0052 13c. Troubleshoot AC generators

A 59 A2-15 Do you troubleshoot AC generator component parts 3

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0053 14. Alternators

0054 14a. Theory of operation

- A 61 A2-17 Do you trace schematic or block diagrams of circuits 2
 containing alternators
 A 64 A2-20 Do you perform tasks on component parts of alternators 1

0055 14b. Isolate faulty alternators

- A 62 A2-18 Do you troubleshoot circuits to isolate a faulty 1
 alternator

0056 14c. Troubleshoot alternators

- A 63 A2-19 Do you troubleshoot alternator component parts 1

0057 15. Synchro/Servos

0058 15a. Theory of operation B

- A 65 A2-21 Do you trace schematic or block diagrams of circuits 7
 containing synchros or servos
 A 68 A2-24 Do you perform tasks on component parts of synchros 6
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0059 15b. Isolate faulty synchro/servos 2b

- A 66 A2-22 Do you troubleshoot circuits to isolate a faulty 7
 synchro or servo

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0060	15c. Troubleshoot synchro/servos 2b	
A 67	A2-23 Do you troubleshoot synchro or servo component parts	6
0061	16. Choppers (Synchronous Vibrators)	
0062	16a. Theory of operation B	
A 69	A2-25 Do you trace schematic or block diagrams of circuits containing choppers	2
0063	16b. Isolate faulty choppers 2b	
A 70	A2-26 Do you troubleshoot circuits to isolate a faulty chopper	2
A 71	A2-27 Do you measure chopper coil excitation frequency	1
A 72	A2-28 Do you measure chopper coil voltage-current phase relationship	1
0064	17. Transducers	
0065	17a. Theory of operation B	
A 73	A2-29 Do you trace schematic or block diagrams of circuits containing transducers	3
A 75	A2-31 Do you calibrate or adjust transducers	3
A 76	A2-32 Do you repair, clean or lubricate transducers	3
0066	17b. Isolate faulty transducers 2b	
A 74	A2-30 Do you troubleshoot circuits to isolate a faulty transducer	4

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0067 18. Meter Movements

0068 18a. Theory of operation B

- A 80 A2-36 Do you trace schematic or block diagrams of circuits 27
 containing meter movements
 A 82 A2-38 Do you perform maintenance on meter movement 12
 mechanical parts

0069 18b. Isolate faulty meter movements 2b

- A 81 A2-37 Do you troubleshoot circuits to isolate a faulty 26
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0070 19. Solid State Diodes

0071 19a. Theory of operation B

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0072 19b. Isolate faulty solid state diodes 2b

- A 84 A3-2 Do you troubleshoot circuits to isolate a faulty diode 80
 A 85 A3-3 Do you check diodes using an ohmmeter 78

0073 19c. Specifications B

- A 86 A3-4 Do you use diode characteristic curves 16
 A 87 A3-5 Do you use diode substitution information 39

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0074 19d. Color code

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88 A3-6 Do you use diode color codes

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0075 20. Bipolar Junction Transistors

0076 20a. Theory of operation

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A 89 A3-7 Do you trace schematic or block diagrams of circuits
containing transistors

85

0077 20b. Isolate faulty transistors

2b

A 90 A3-8 Do you troubleshoot circuits to isolate a faulty
transistor

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A 91 A3-9 Do you check transistors using an ohmmeter

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A 92 A3-10 Do you check transistors using transistor testers

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0078 20c. Specifications

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A 93 A3-11 Do you use transistor characteristic curves

16

A 94 A3-12 Do you use transistor substitution information

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0079 21. Integrated Circuits

0080 21a. Familiarization

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A 95 A3-13 Do you trace schematic or block diagrams of
circuits containing integrated circuits (IC)

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0081 21b. Isolate faulty integrated circuits 2b

A 96 A3-14 Do you troubleshoot circuits to isolate a faulty IC 69

0082 21c. Specifications B

A 97 A3-15 Do you use IC substitution information 36

0083 22. Solid State Special Purpose Devices
(SCR, Zener Diode, Tunnel Diode, LED,
LCD, UJT, JFET, MOSFET)

0084 22a. Theory of operation B

A 98 A3-16 Do you trace schematic or block diagrams of circuits
containing solid-state special purpose devices 54
A 100 A3-18 Do you perform tasks on varactors/varicaps 28
A 101 A3-19 Do you perform tasks on tunnel diodes 23
A 102 A3-20 Do you perform tasks on field effect transistors (FET) 36
A 103 A3-21 Do you perform tasks on unijunction transistors (UJT) 45
A 104 A3-22 Do you perform tasks on zener diodes 69
A 105 A3-23 Do you perform tasks on liquid crystal displays (LCD) 26
A 106 A3-24 Do you perform tasks on pin diodes 17
A 107 A3-25 Do you perform tasks on light emitting diodes (LED) 49
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A 109 A3-27 Do you perform tasks on silicon controlled rectifiers
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A 110 A3-28 Do you perform tasks on triacs 9
A 111 A3-29 Do you perform tasks on programmable unijunction
transistors (PUT) 7
A 112 A3-30 Do you perform tasks on silicon controlled
switches (SCS) 12
A 113 A3-31 Do you perform tasks on silicon unilateral
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A 114 A3-32 Do you perform tasks on step recovery diodes (SRD) 7
A 115 A3-33 Do you perform tasks on field effect diodes (FED) 14
A 116 A3-34 Do you perform tasks on DIAC (Bi-directional
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A 117 A3-35 Do you perform tasks on varistors 51
A 118 A3-36 Do you perform tasks on metal oxide varistors (MOV) 7

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A 119 A3-37 Do you perform tasks on schottky diodes 5

0085 22b. Isolate faulty special purpose devices 2b

A 99 A3-17 Do you troubleshoot circuits to isolate a faulty solid-state special purpose device 51

0086 23. Electron Tubes

0087 23a. Theory of operation B

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A 121 A4-2 Do you trace schematic diagrams of electron tube circuits 31

A 125 A4-6 Do you perform tasks on diode tubes 21

A 126 A4-7 Do you perform tasks on triode tubes 23

A 127 A4-8 Do you perform tasks on tetrode tubes 22

A 128 A4-9 Do you perform tasks on pentode tubes 21

A 129 A4-10 Do you perform tasks on beam power tubes 3

A 130 A4-11 Do you perform tasks on gas tubes 13

A 131 A4-12 Do you perform tasks on phantastrons 2

A 132 A4-13 Do you perform tasks on neon tubes 6

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A 134 A4-15 Do you perform tasks on nixie tubes 3

0088 23b. Isolate faulty tubes

A 122 A4-3 Do you troubleshoot circuits to isolate a faulty electron tube 31

0089 23c. Specifications

A 123 A4-4 Do you use electron tube characteristic curves 8

A 124 A4-5 Do you use electron tube substitution manuals or charts 14

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0090	24.	Cathode Ray Tubes (CRT)	
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A 136	A4-17	Do you trace schematic diagrams of CRT circuits	6
A 138	A4-19	Do you adjust or calibrate circuits that control CRT operations	6
A 139	A4-20	Do you perform tasks on electrostatic CRT	4
A 140	A4-21	Do you perform tasks on electromagnetic CRT	2
0092	24b.	Isolate faulty CRTs	2b
A 137	A4-18	Do you troubleshoot to isolate a faulty CRT	6
0093	25.	Solder/Desolder	
0094	25a.	Terminal connections	2b
A 141	A5-1	Do you solder or desolder hardware connections	96
A 142	A5-2	Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc	88
0095	25b.	P C Boards	2b
A 143	A5-3	Do you solder or desolder printed circuit board connections	81
A 144	A5-4	Do you solder or desolder multi-layer circuit board connections	25
A 145	A5-5	Do you perform high reliability soldering	67

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0096 25c. Multipin connectors 2b

A 149 A5-9 Do you repair or fabricate connectors or cables on
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A 152 A5-12 Do you repair or fabricate connectors or cables on
ribbon cables 30

0097 25d. Coaxial connectors

A 150 A5-10 Do you repair or fabricate connectors or cables on
coaxial cables 72
A 151 A5-11 Do you repair or fabricate connectors or cables on
triaxial cables 31

0098 26. Assemble Solderless Connectors

0099 26a. Crimp 2b

A 146 A5-6 Do you use crimping tool to repair or make connections 88
A 147 A5-7 Do you use wire wrap tool to make connections 71
A 148 A5-8 Do you use punch-on tool to make connections 62

0100 26b. Coaxial 2b

A 150 A5-10 Do you repair or fabricate connectors or cables on
coaxial cables 72
A 151 A5-11 Do you repair or fabricate connectors or cables on
triaxial cables 31

0101 26c. Multipin 2b

A 149 A5-9 Do you repair or fabricate connectors or cables on
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A 152 A5-12 Do you repair or fabricate connectors or cables on
ribbon cables 30

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0103 27a. Multimeter, analog 2b

B 153 B1-1 Do you use the multimeter to measure DC voltage values 97
 B 154 B1-2 Do you use the multimeter to measure AC voltage values 94
 B 155 B1-3 Do you use the multimeter to extend the range of
 voltmeters using external shunts 19
 B 156 B1-4 Do you use the multimeter to measure DC current values 77
 B 157 B1-5 Do you use the multimeter to measure AC current values 70
 B 158 B1-6 Do you use the multimeter to extend the range of
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 B 159 B1-7 Do you use the multimeter to measure circuit resistance 74
 B 160 B1-8 Do you use the multimeter to measure component
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0104 27b. Oscilloscope 2b

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 determine frequency 74
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 fall, pulse width, etc) 76
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 B 166 B2-6 Do you use the oscilloscope to measure phase jitters 42
 B 167 B2-7 Do you use the oscilloscope to observe signal/data
 patterns 89
 B 168 B2-8 Do you use the oscilloscope to observe lissajous
 patterns 62
 B 169 B2-9 Do you use the oscilloscope to observe phase
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 B 170 B2-10 Do you use attenuator probes with oscilloscopes 69
 B 171 B2-11 Do you use delay time multipliers with
 oscilloscopes 25

0105 27c. Signal Generator 2b

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 operational checks 60

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0106	27d. Frequency counter	2b

B 185	B4-1 Do you use frequency counters	83

0107	27e. Spectrum Analyzer	2b

B 186	B4-2 Do you use spectrum analyzers	15

0108	27f. Field strength tester	-

B 187	B4-3 Do you use field strength testers	3

0109	27g. Multimeter, digital	2b

B 188	B4-4 Do you use digital multimeters	95

0110	27h. Digital logic probe	2b

B 189	B4-5 Do you use digital logic probes	17

0111	27i. Capacitor tester	2b

B 190	B4-6 Do you use capacitance testers	17

0112	27j. Capacitor substitution box	-

B 191	B4-7 Do you use capacitor substitution boxes	5

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0113	27k. DC restorer	
B 192	B4-8 Do you use DC restorers (CRT rejuvenators)	4
0114	27l. Logic current tracer	
B 193	B4-9 Do you use logic current tracers	6
0115	27m. Tube tester	
B 194	B4-10 Do you use tube testers	13
0116	27n. Logic pulser	
B 195	B4-11 Do you use logic pulsers	6
0117	27o. Logic analyzer	2b
B 196	B4-12 Do you use logic analyzers	8
0118	27p. Signature analyzer	
B 197	B4-13 Do you use signature analyzers	4
0119	27q. Reflectometer	2b
B 198	B4-14 Do you use reflectometers	4
0120	28. Transistor Amplifier Circuits (Common Emitter, Common Collector, Common Base)	

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0121 28a. Theory of operation

0122 28a(1). Amplifier circuits B

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C 200	Cl-2 Do you trace schematic diagrams of transistor amplifier circuits	69
C 204	Cl-6 Do you adjust or align transistor amplifiers	38
C 206	Cl-8 Do you calculate values of transistor amplifier voltage, current or power gain	25
C 207	Cl-9 Do you work on compound-connected (Darlington Pair) transistor amplifiers	11
C 208	Cl-10 Do you work on cascade-connected transistor amplifiers	23
C 209	Cl-11 Do you work on paraphase transistor amplifiers	11
C 210	Cl-12 Do you work on push-pull transistor amplifiers	50
C 211	Cl-13 Do you work on audio transistor amplifiers	50
C 212	Cl-14 Do you work on wideband transistor amplifiers	28
C 213	Cl-15 Do you work on IF transistor amplifiers	12
C 214	Cl-16 Do you work on RF transistor amplifiers	17
C 215	Cl-17 Do you work on buffer transistor amplifiers	44
C 216	Cl-18 Do you work on complementary symmetry transistor amplifiers	8
C 217	Cl-19 Do you work on DC transistor amplifiers (switching applications)	42

0123 28a(2). Stabilization circuits B

C 218	C2-1 Do you trace schematic diagrams of amplifier stabilization circuits	34
C 220	C2-3 Do you perform tasks on emitter (swamping) resistor stabilization amplifiers	26
C 221	C2-4 Do you perform tasks on self-bias stabilization amplifiers	25
C 222	C2-5 Do you perform tasks on thermistor stabilization amplifiers	26
C 223	C2-6 Do you perform tasks on diode stabilization amplifiers	33
C 224	C2-7 Do you perform tasks on double diode stabilization amplifiers	14

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0124	28a(3).	Coupling circuits	B
C 225	C3-1	Do you trace block diagrams of circuits containing coupling circuits	46
C 226	C3-2	Do you trace schematic diagrams of coupling circuits	46
C 229	C3-5	Do you perform tasks on direct coupling circuits	43
C 230	C3-6	Do you perform tasks on capacitive-resistive coupling circuits	37
C 231	C3-7	Do you perform tasks on capacitive-inductive coupling circuits	33
C 232	C3-8	Do you perform tasks on transformer coupling circuits	38
C 233	C3-9	Do you perform tasks on optical coupling circuits	9

0125	28b.	Isolate faulty amplifier circuits	2b
C 201	C1-3	Do you troubleshoot to isolate a faulty transistor amplifier	68
C 205	C1-7	Do you measure transistor amplifier voltage, current, or power gain	47
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0126	28c.	Troubleshoot circuits	2b
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C 203	C1-5	Do you troubleshoot transistor amplifier distortion	36
C 219	C2-2	Do you troubleshoot amplifier stabilization circuits to circuit level components	33
C 228	C3-4	Do you troubleshoot coupling circuits to circuit level components	40

0127	29.	Electron Tube Amplifiers	

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0128 29a. Theory of operation

C 234	C4-1 Do you trace block diagrams of circuits containing electron tube amplifiers	17
C 235	C4-2 Do you trace schematic diagrams of electron tube amplifiers	18
C 239	C4-6 Do you adjust or align electron tube amplifiers	12
C 241	C4-8 Do you calculate values of electron tube amplifier voltage, current, or power gain	7
C 242	C4-9 Do you perform tasks on paraphase electron tube amplifiers	4
C 243	C4-10 Do you perform tasks on push-pull electron tube amplifiers	11
C 244	C4-11 Do you perform tasks on audio electron tube amplifiers	6
C 245	C4-12 Do you perform tasks on voltage regulator electron tube amplifiers	16
C 246	C4-13 Do you perform tasks on common grid electron tube amplifiers	15
C 247	C4-14 Do you perform tasks on common cathode electron tube amplifiers	16
C 248	C4-15 Do you perform tasks on cathode follower electron tube amplifiers	13

0129 29b. Isolate faulty tube amplifiers

C 236	C4-3 Do you troubleshoot to isolate a faulty electron tube amplifier	18
C 240	C4-7 Do you measure electron tube amplifier voltage, current, or power gain	13

0130 29c. Troubleshoot circuits

C 237	C4-4 Do you troubleshoot electron tube amplifiers to circuit level components	17
C 238	C4-5 Do you troubleshoot electron tube amplifier distortion	11

0131 30. Operational Amplifiers

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0132 30a. Theory of operation B

C 249 C5-1 Do you trace block or schematic diagrams of circuits 40
 containing operational amplifiers (op amps)
 C 251 C5-3 Do you calculate op amp gain 13
 C 252 C5-4 Do you adjust op amp bias, offsets, or drift 21
 C 253 C5-5 Do you use or apply operational amplifiers for 36
 general purpose (inverting or non-inverting)
 C 254 C5-6 Do you use or apply operational amplifiers as 18
 differential/comparators
 C 255 C5-7 Do you use or apply operational amplifiers for 9
 summing
 C 256 C5-8 Do you use or apply operational amplifiers for 20
 unity gain amplifier (buffer)
 C 257 C5-9 Do you use or apply operational amplifiers as 19
 active filters
 C 258 C5-10 Do you use or apply operational amplifiers as 30
 oscillators
 C 259 C5-11 Do you use or apply operational amplifiers as 13
 integrators
 C 260 C5-12 Do you use or apply operational amplifiers for 13
 differentiators
 C 261 C5-13 Do you use or apply operational amplifiers for 41
 power supplies (voltage regulators)
 C 262 C5-14 Do you use or apply operational amplifiers as 37
 analog/digital (A/D) digital/analog (D/A) converters
 C 263 C5-15 Do you use or apply operational amplifiers as 37
 multivibrators
 C 264 C5-16 Do you use or apply operational amplifiers as 33
 modulators/demodulators

0133 30b. Isolate faulty Op Amps

C 250 C5-2 Do you troubleshoot to isolate a faulty op amp circuit 40

0134 31. Magnetic Amplifiers

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0135 31a. Theory of operation -

C 265 C6-1 Do you trace block diagrams of circuits containing magnetic amplifiers 4
C 266 C6-2 Do you trace schematic diagrams of magnetic amplifier circuits 4
C 269 C6-5 Do you adjust magnetic amplifiers or components 2

0136 31b. Isolate faulty magnetic amplifiers -

C 267 C6-3 Do you troubleshoot to isolate a faulty magnetic amplifier 3

0137 31c. Troubleshoot circuits -

C 268 C6-4 Do you troubleshoot magnetic amplifiers to circuit level components 3

0138 32. Saturable Reactors

0139 32a. Theory of operation -

C 270 C6-6 Do you trace block diagrams of circuits containing saturable reactors 3
C 271 C6-7 Do you trace schematic diagrams of saturable reactor circuits 3
C 274 C6-10 Do you adjust saturable reactor circuits or components 2

0140 32b. Isolate faulty saturable reactors -

C 272 C6-8 Do you troubleshoot to isolate a faulty saturable reactor 3

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0141 32c. Troubleshoot circuits

C 273 C6-9 Do you troubleshoot saturable reactors to circuit level components 3

0142 33. Power Supply Circuits (Half-wave, Full-wave, full-wave bridge)

0143 33a. Theory of operation

0144 33a(1). Rectifiers (Half-wave, Full-wave, B Full-wave bridge)

D 275 D1-1 Do you trace block diagrams of circuits containing power supplies 86
D 276 D1-2 Do you trace schematic diagrams of power supply circuits 85
D 279 D1-5 Do you align or adjust power supplies 87
D 280 D1-6 Do you perform tasks on half-wave rectifier power supplies 67
D 281 D1-7 Do you perform tasks on full-wave rectifier power supplies 72
D 282 D1-8 Do you perform tasks on full-wave bridge rectifier power supplies 74
D 283 D1-9 Do you perform tasks on three-phase rectifier power supplies 23

0145 33a(2). Filters (Capacitive, Inductive, B L-Section, Pi-Section)

D 288 D2-1 Do you trace block diagrams of circuits containing power supply filters 68
D 289 D2-2 Do you trace schematic diagrams of power supply filters 67
D 292 D2-5 Do you perform tasks on capacitive power supply filters 60
D 293 D2-6 Do you perform tasks on inductive power supply filters 52
D 294 D2-7 Do you perform tasks on L-type power supply filters 34

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D 295	D2-8 Do you perform tasks on Pi-type power supply filters	29
D 296	D2-9 Do you perform tasks on T-type power supply filters	26
D 297	D2-10 Do you perform tasks on resistive capacitive (RC) power supply filters	59
D 298	D2-11 Do you perform tasks on inductive capacitive (LC) power supply filters	54

0146	33b. Isolate faulty power supplies 2b	
D 277	D1-3 Do you troubleshoot circuits to isolate a faulty power supply	88
D 290	D2-3 Do you troubleshoot circuits to isolate a faulty power supply filter	66

0147	33c. Troubleshoot circuits 2b	
D 278	D1-4 Do you troubleshoot power supplies to circuit level components	81
D 291	D2-4 Do you troubleshoot power supply filters to circuit level components	58

0148	34. Voltage Regulators (Shunt, Series EVR, IC EVR)	

0149	34a. Theory of operation B	
D 299	D3-1 Do you trace block diagrams of circuits containing power supply voltage regulators	70
D 300	D3-2 Do you trace schematic diagrams of power supply voltage regulator circuits	69
D 303	D3-5 Do you perform tasks on variable resistor power supply voltage regulators	64
D 304	D3-6 Do you perform tasks on zener diode power supply voltage regulators	62
D 305	D3-7 Do you perform tasks on transistor series power supply voltage regulators	53
D 306	D3-8 Do you perform tasks on IC power supply voltage regulators	31
D 307	D3-9 Do you perform tasks on pulse width modulator power supply voltage regulators	20

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D 308 D3-10 Do you perform tasks on transistor series power supply voltage regulators with current limiting 29
 D 309 D3-11 Do you perform tasks on crow bar power supply voltage regulators 10

0150 34b. Isolate faulty voltage regulators 2b

D 301 D3-3 Do you troubleshoot circuits to isolate a faulty power supply voltage regulator 68

0151 34c. Troubleshoot circuits 2b

D 302 D3-4 Do you troubleshoot power supply voltage regulators to circuit level components 65

0152 35. Resistive/Capacitive/Inductive (RCL) Circuits

0153 35a. Basic operation B

E 310 E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits 35

0154 35b. Resonant operation B

E 312 E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits 31

0155 35c. Troubleshoot circuits 2b

E 311 E1-2 Do you troubleshoot RCL circuits to circuit level components 33

E 313 E1-4 Do you troubleshoot resonant RCL circuits to circuit level components 31

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0156 35d. Calculations

B

E 314 E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits 13

E 315 E1-6 Do you calculate phase angle of RCL circuits 9

E 316 E1-7 Do you calculate values of power in RCL circuits 10

0157 36. Frequency Sensitive Filters (Low Pass, High Pass, Band Pass, Band Reject)

0158 36a. Theory of operation

B

E 317 E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters 30

E 320 E2-4 Do you align or adjust frequency sensitive filters 23

E 322 E2-6 Do you perform tasks on low pass frequency sensitive filters 31

E 323 E2-7 Do you perform tasks on high pass frequency sensitive filters 31

E 324 E2-8 Do you perform tasks on band pass frequency sensitive filters 31

E 325 E2-9 Do you perform tasks on band-reject frequency sensitive filters 22

E 326 E2-10 Do you perform tasks on ferrite bead frequency sensitive filters 4

0159 36b. Isolate faulty frequency sensitive filters

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E 318 E2-2 Do you troubleshoot circuits to isolate a faulty frequency sensitive filter 30

0160 36c. Troubleshoot circuits

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E 319 E2-3 Do you troubleshoot frequency sensitive filters to circuit level components 28

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0161 36d. Calculations

E 321 E2-5 Do you calculate capacitance or inductance values for 11
 specific frequency sensitive filters

0162 37. Wave Generating Circuits

0163 37a. Theory of operation

0164 37a(1). Oscillators (LC, RC, Crystal) B

F 327 F1-1 Do you trace block diagrams of circuits containing 67
 oscillators
 F 328 F1-2 Do you trace schematic diagrams of oscillator circuits 66
 F 331 F1-5 Do you align or adjust oscillator circuits 62
 F 332 F1-6 Do the oscillators you work with use LC tank circuits 42
 F 333 F1-7 Do the oscillators you work with use RC networks 40
 F 334 F1-8 Do the oscillators you work with use crystals 65
 F 335 F1-9 Do the oscillators you work with use phase lock 17
 loops (PLL)
 F 336 F1-10 Do you perform tasks on series Hartley oscillator 29
 circuits
 F 337 F1-11 Do you perform tasks on shunt Hartley oscillator 28
 circuits
 F 338 F1-12 Do you perform tasks on Colpitts oscillator circuits 26
 F 339 F1-13 Do you perform tasks on Clapp oscillator circuits 11
 F 340 F1-14 Do you perform tasks on voltage control oscillators 17
 (VCO/VTD)
 F 341 F1-15 Do you perform tasks on crystal oscillator circuits 60
 F 342 F1-16 Do you perform tasks on Wien bridge oscillator 7
 circuits
 F 343 F1-17 Do you perform tasks on pulse generating oscillator 22
 circuits
 F 344 F1-18 Do you perform tasks on blocked/blocking oscillator 6
 circuits
 F 345 F1-19 Do you perform tasks on burst generators 6
 F 346 F1-20 Do you perform tasks on RC phase shift oscillators 16

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0165 37a(2). Multivibrators (Astable, Bistable, B Monostable)

F 347 F2-1 Do you trace block diagrams of circuits containing multivibrators 64
F 348 F2-2 Do you trace schematic diagrams of multivibrator circuits 63
F 351 F2-5 Do you adjust or align multivibrator circuits 33
F 352 F2-6 Do the multivibrators you work with use LC tank circuits 40
F 353 F2-7 Do the multivibrators you work with use RC networks 43
F 354 F2-8 Do the multivibrators you work with use Crystals 45
F 355 F2-9 Do you perform tasks on astable (free running) multivibrators 58
F 356 F2-10 Do you perform tasks on monostable (one shot) multivibrators 63
F 357 F2-11 Do you perform tasks on bistable (flip flop) multivibrators 65
F 358 F2-12 Do you perform tasks on triggered astable multivibrators 46

0166 37a(3). Waveshaping Circuits (Schmitt Trigger, Sawtooth, RC Integ/Diff) B

F 359 F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC) 47
F 360 F3-2 Do you trace schematic diagrams of WSC 46
F 363 F3-5 Do you adjust or calibrate WSC 32
F 364 F3-6 Do you perform tasks on sawtooth wave generator WSC 39
F 365 F3-7 Do you perform tasks on trapezoidal (ramp) wave generator WSC 11
F 366 F3-8 Do you perform tasks on RC differentiating WSC 24
F 367 F3-9 Do you perform tasks on RL differentiating WSC 21
F 368 F3-10 Do you perform tasks on RC integrating WSC 21
F 369 F3-11 Do you perform tasks on RL integrating WSC 20
F 370 F3-12 Do you perform tasks on square wave generator WSC 44
F 371 F3-13 Do you perform tasks on rectangular wave generator WSC 22
F 372 F3-14 Do you perform tasks on Schmitt trigger WSC 46

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0167 37b. Isolate faulty wave generating circuits 2b

F 329 F1-3 Do you troubleshoot to isolate a faulty oscillator circuit 65
F 349 F2-3 Do you troubleshoot to isolate a faulty multivibrator circuit 62
F 361 F3-3 Do you troubleshoot to isolate a faulty WSC 46

0168 37c. Troubleshoot circuits 2b

F 330 F1-4 Do you troubleshoot oscillators to circuit level components 59
F 350 F2-4 Do you troubleshoot multivibrators to circuit level components 56
F 362 F3-4 Do you troubleshoot WSC to circuit level components 42

0169 38. Limiter Circuits (Diode, Zener Diode, Transistor)

0170 38a. Theory of operation B

F 373 F4-1 Do you trace block diagrams of circuits containing limiters 44
F 374 F4-2 Do you trace schematic diagrams of limiter circuits 43
F 381 F4-9 Do you perform tasks on series diode limiter circuits 38
F 382 F4-10 Do you perform tasks on shunt diode limiter circuits 36
F 383 F4-11 Do you perform tasks on bias limiter circuits 22
F 384 F4-12 Do you perform tasks on zener diode circuits 41
F 385 F4-13 Do you perform tasks on transistor limiter circuits 30
F 386 F4-14 Do you perform tasks on triode limiter circuits 12

0171 38b. Isolate faulty limiters 2b

F 377 F4-5 Do you troubleshoot to isolate a faulty limiter circuit 40

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0172 38c. Troubleshoot circuits 2b

F 378 F4-6 Do you troubleshoot limiters to circuit level components 37

0173 39. Clamper Circuits

0174 39a. Theory of operation B

F 375 F4-3 Do you trace block diagrams of circuits containing clampers 39

F 376 F4-4 Do you trace schematic diagrams of clamper circuits 37

F 387 F4-15 Do you perform tasks on diode clamper circuits 35

F 388 F4-16 Do you perform tasks on bias clamper circuits 22

0175 39b. Isolate faulty clampers 2b

F 379 F4-7 Do you troubleshoot to isolate a faulty clamper circuit 35

0176 39c. Troubleshoot circuits 2b

F 380 F4-8 Do you troubleshoot clampers to circuit level components 33

0177 40. Digital Numbering Systems (Binary, Octal, Hexadecimal)

0178 40a. Conversions B

G 389 G1-1 Do you convert decimal numbers to binary numbers or binary numbers to decimal 22

G 390 G1-2 Do you convert octal numbers to binary or binary numbers to octal 12

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G 391		G1-3 Do you convert hexadecimal numbers to binary or binary numbers to hexadecimal	19
G 392		G1-4 Do you convert octal numbers to decimal or decimal numbers to octal	10
G 393		G1-5 Do you convert hexadecimal numbers to decimal or decimal numbers to hexadecimal	19
G 394		G1-6 Do you convert octal numbers to hexadecimal or hexadecimal numbers to octal	11
G 395		G1-7 Do you convert base number fractions to another base numbering system	9

0179 40b. Math operations B

G 396	G1-8 Do you add binary numbers	20
G 397	G1-9 Do you subtract binary numbers	18
G 398	G1-10 Do you multiply binary numbers	12
G 399	G1-11 Do you divide binary numbers	11
G 400	G1-12 Do you add octal numbers	9
G 401	G1-13 Do you subtract octal numbers	9
G 402	G1-14 Do you add hexadecimal numbers	14
G 403	G1-15 Do you subtract hexadecimal numbers	13

0180 40c. Binary Code Systems B

G 404	G1-16 Do you use binary coded decimal (BCD)	14
G 405	G1-17 Do you use gray codes	2
G 406	G1-18 Do you use ICAO codes	1
G 407	G1-19 Do you use excess-3 (XS3) codes	1
G 408	G1-20 Do you use parity bit codes	12
G 409	G1-21 Do you use biquinary codes	2
G 410	G1-22 Do you use ASCII codes	20
G 411	G1-23 Do you use EBCDI codes	3

0181 41. Digital Logic Functions (Main Logic Gates and Flip-Flops)

0182 41a. Theory of operation B

G 412	G1-24 Do you trace data flow through logic symbol diagrams	57
G 413	G1-25 Do you trace data flow through logic schematic diagrams	57

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G 417	G1-29 Do you trace data flow through circuits using positive logic (High = Binary 1)	49
G 418	G1-30 Do you trace data flow through circuits using negative logic (High = Binary 0)	44
G 419	G1-31 Do you perform tasks related to AND gates	63
G 420	G1-32 Do you perform tasks related to OR gates	63
G 421	G1-33 Do you perform tasks related to inhibited gates logic functions	47
G 422	G1-34 Do you perform tasks related to NAND or NOR gates	62
G 423	G1-35 Do you perform tasks related to exclusive OR/NOR logic functions	60
G 424	G1-36 Do you perform tasks related to RS flip flops	34
G 425	G1-37 Do you perform tasks related to D(Data) flip flops	43
G 426	G1-38 Do you perform tasks related to T(Toggle) flip flops	40
G 427	G1-39 Do you perform tasks related to JK flip flops	27
G 428	G1-40 Do you perform tasks related to Schmidt triggers	51
G 429	G1-41 Do you perform tasks related to delay (One-shot) logic functions	51
G 430	G1-42 Do you perform tasks related to open collector gates (wired "AND" or wired "OR")	31
G 431	G1-43 Do you perform tasks related to buffers	46
G 432	G1-44 Do you perform tasks related to inverters	53
G 433	G1-45 Do you perform tasks related to complemented flip flops	26
G 434	G1-46 Do you perform tasks related to complementing flip flops	26

0183	41b. Isolate faulty logic function circuits 2b	
G 414	G1-26 Do you troubleshoot digital systems to major units	55
G 415	G1-27 Do you troubleshoot digital systems subassemblies or circuit cards	57

0184	41c. Troubleshoot circuits 2b	
G 416	G1-28 Do you troubleshoot digital systems, subsystems or circuit cards to circuit level components or IC	48

0185	41d. Logic families (TTL and CMOS) B	
G 438	G1-50 Do you perform tasks on RTL (resistor transistor logic formally DCTL)	16
G 439	G1-51 Do you perform tasks on DIL (diode transistor logic)	21

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G 440		G1-52 Do you perform tasks on TTL (transistor transistor logic)	26
G 441		G1-53 Do you perform tasks on ECL/CML (emitter coupled or current mode logic)	7
G 442		G1-54 Do you perform tasks on HTL (high threshold logic)	6
G 443		G1-55 Do you perform tasks on CMOS (complementary metal oxide semiconductor)	21
G 444		G1-56 Do you perform tasks on positive MOS ICs	10
G 445		G1-57 Do you perform tasks on negative MOS ICs	9
G 446		G1-58 Do you perform tasks on vertical MOS ICs	6

0186 42. Boolean Equations

0187 42a. Diagram to equation B

G 435 G1-47 Do you develop Boolean equations from logic circuits or diagrams 17

0188 42b. Equation to diagram B

G 436 G1-48 Do you develop logic diagrams from Boolean equations 17

0189 42c. Simplify Expressions

G 437 G1-49 Do you simplify Boolean expressions using Boolean algebra 18

0190 43. Computers

0191 43a. Operation principles B

G 447	G2-1	Do you trace block or schematic diagrams of computer controlled or computer based systems	13
G 454	G2-8	Do you perform tasks on analog computers	7
G 455	G2-9	Do you perform tasks on digital computers	18

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0192	43b. Load programs	2b
G 448	G2-2 Do you load programs	16
0193	43c. Write/debug programs	2b
G 449	G2-3 Do you write or debug programs	6
G 453	G2-7 Do you use computer flow charts or diagrams	11
0194	43d. Fault isolation	2b
G 450	G2-4 Do you troubleshoot computers to a major unit	14
G 451	G2-5 Do you troubleshoot computers to a subassembly or circuit card	14
0195	43e. Circuit troubleshooting	2b
G 452	G2-6 Do you troubleshoot computer subassembly or circuit card to circuit level components or IC	6
0196	43f. Types of memories	B
G 466	G2-20 Do you perform tasks on magnetic (tape, disc, core) computer memories	15
G 467	G2-21 Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories	14
G 468	G2-22 Do you perform tasks on paper (tape, punch card) computer memories	2
G 469	G2-23 Do you perform tasks on advanced technology (bubble, CCD, electron beam, laser, thin film) computer memories	2
0197	43g. Peripheral devices	B
G 470	G2-24 Do you perform tasks on computer keyboards	17
G 471	G2-25 Do you perform tasks on computer character printers	11
G 472	G2-26 Do you perform tasks on magnetic tape drives	9

PRTHOD

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G 473	G2-27	9	Do you perform tasks on microprocessor computer terminals	9	
G 474	G2-28	11	Do you perform tasks on video display unit (VDU/monitors)	11	
G 475	G2-29	4	Do you perform tasks on paper tape readers/punches	4	
G 476	G2-30	1	Do you perform tasks on paper card readers/punches	1	
G 477	G2-31	8	Do you perform tasks on toggle or push button switch inputs	8	
G 478	G2-32	7	Do you perform tasks on incandescent displays (Nixie tubes, LEDs, LCDs)	7	
G 479	G2-33	26	Do you perform tasks on modems	26	
G 480	G2-34	9	Do you perform tasks on line printers	9	
G 481	G2-35	9	Do you perform tasks on floppy disc drives	9	
G 482	G2-36	4	Do you perform tasks on removable cartridge disc drives	4	
G 483	G2-37	3	Do you perform tasks on removable pack disc drives	3	
G 484	G2-38	3	Do you perform tasks on fixed Winchester type disc drives	3	

0198 43h. Programming languages

G 456	G2-10	9	Do you use Basic computer language	9	
G 457	G2-11	2	Do you use COBOL computer language	2	
G 458	G2-12	0	Do you use FORTRAN computer language	0	
G 459	G2-13	1	Do you use ADA computer language	1	
G 460	G2-14	0	Do you use ATLAS computer language	0	
G 461	G2-15	0	Do you use ELAN computer language	0	
G 462	G2-16	1	Do you use PASCAL computer language	1	
G 463	G2-17	0	Do you use RPG computer language	0	
G 464	G2-18	5	Do you use Machine computer language	5	
G 465	G2-19	0	Do you use C computer language	0	

0199 44. Microprocessor Controlled Systems

0200 44a. Theory of operation B

G 485	G2-39	9	Do you trace block or schematic diagrams of microprocessor controlled systems	9	
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0201 44b. Isolate faulty microprocessors 2b

G 486 G2-40 Do you troubleshoot microprocessor controlled systems to a subassembly or circuit card 10
G 487 G2-41 Do you troubleshoot microprocessor controlled systems to isolate a faulty microprocessor 6

0202 45. Logic Circuits

0203 45a. Theory of operation

0204 45a(1). Counters (Synchronous/
Asynchronous-Up/Down counters) B

G 488 G3-1 Do you trace data flow through circuits containing counters 54
G 491 G3-4 Do you perform tasks on UP counters in logic circuits 43
G 492 G3-5 Do you perform tasks on DOWN counters in logic circuits 41
G 493 G3-6 Do you perform tasks on DECADE counters in logic circuits 24
G 494 G3-7 Do you perform tasks on ring counters in logic circuits 26
G 495 G3-8 Do you perform tasks on modulus counters in logic circuits 20
G 496 G3-9 Do you perform tasks on synchronous (parallel) counters in logic circuits 47
G 497 G3-10 Do you perform tasks on asynchronous (serial) counters in logic circuits 46

0205 45a(2). Registers (Shift and Storage) B

G 498 G3-11 Do you trace logic diagrams of circuits containing registers 49
G 501 G3-14 Do you perform tasks on shift registers in logic circuits 50

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G 502 G3-15 Do you perform tasks on storage registers in logic circuits 43

0206 45a(3). Combinational Logic Circuits B
(Half-adder, Full-adder, encoder,
Decoder, Multiplexer, Demultiplexer,
Count Detect)

G 503 G3-16 Do you trace data flow through combinational logic circuits 39
G 506 G3-19 Do you perform tasks on encoders 42
G 507 G3-20 Do you perform tasks on decoders 42
G 508 G3-21 Do you perform tasks on multiplexers 31
G 509 G3-22 Do you perform tasks on demultiplexers 24
G 510 G3-23 Do you perform tasks on comparators 32
G 511 G3-24 Do you perform tasks on parity generators or checkers 20
G 512 G3-25 Do you perform tasks on code converters 17
G 513 G3-26 Do you perform tasks on adders 38
G 514 G3-27 Do you perform tasks on subtractors 19
G 515 G3-28 Do you perform tasks on count detect circuits 16

0207 45b. Isolate faulty circuits 2b

G 489 G3-2 Do you troubleshoot counter circuits to isolate a faulty counter 53
G 499 G3-12 Do you troubleshoot circuits containing registers to isolate a faulty register 47
G 504 G3-17 Do you troubleshoot to isolate a faulty combinational logic circuit 38

0208 45c. Troubleshoot circuits -

G 490 G3-3 Do you troubleshoot counters to circuit level components 50
G 500 G3-13 Do you troubleshoot registers to circuit level components 43
G 505 G3-18 Do you troubleshoot combinational logic circuits to circuit level components 34

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0209 46. D/A, A/D Converters (Approx D/A and Ramp A/D)

0210 46a. Theory of operation B

G 516 G4-1 Do you trace data flow through A/D converters 41
G 517 G4-2 Do you trace data flow through D/A converters 41
G 520 G4-5 Do the converters you perform tasks on use flash conversion 3
G 521 G4-6 Do the converters you perform tasks on use successive approximation conversion 8
G 522 G4-7 Do the converters you perform tasks on use ramp conversion 3
G 523 G4-8 Do the converters you perform tasks on use R2R conversion 3

0211 46b. Isolate faulty converters 2b

G 518 G4-3 Do you troubleshoot A/D converter circuits 36
G 519 G4-4 Do you troubleshoot D/A converter circuits 36

0212 47. Transmission Lines

0213 47a. Theory of operation B

H 527 H1-4 Do you construct transmission lines 9
H 528 H1-5 Do you match transmission line impedance with loads 17
H 531 H1-8 Do you perform tasks on open-wire transmission lines 13
H 532 H1-9 Do you perform tasks on twisted pair transmission lines 26
H 533 H1-10 Do you perform tasks on twin lead transmission lines 15
H 534 H1-11 Do you perform tasks on flexible coaxial transmission lines 14
H 535 H1-12 Do you perform tasks on rigid coaxial transmission lines 8
H 536 H1-13 Do you perform tasks on fiber-optic transmission lines 9

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0214	47b. Perform Measurements	2b
H 524	H1-1 Do you measure electrical length on transmission lines	6
H 525	H1-2 Do you measure physical length on transmission lines	8
H 526	H1-3 Do you measure standing wave ratio (SWR) on transmission lines	5
0215	47c. Calculations	-
H 529	H1-6 Do you calculate the characteristic impedance (Z0) of transmission lines	6
0216	47d. Isolate faulty transmission lines	-
H 530	H1-7 Do you troubleshoot transmission lines	25
0217	48. Waveguides	
0218	48a. Theory of operation	B
H 537	H1-14 Do you trace schematic or block diagrams of circuits containing waveguides	1
H 539	H1-16 Do you pressurize or purge waveguide assemblies	1
H 540	H1-17 Do you measure standing wave ratio for waveguide assemblies	1
H 541	H1-18 Do you remove or install waveguide or associated coupling hardware components	1
0219	48b. Isolate faulty waveguides	2b
H 538	H1-15 Do you troubleshoot circuits to isolate a faulty waveguide assembly	1

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0220 49. Microwave Oscillators & Amplifiers

0221 49a. Theory of operation B

- H 542 H2-1 Do you trace schematic or block diagrams of circuits containing microwave oscillators or amplifiers 1
- H 545 H2-4 Do you perform tasks on two-cavity klystron microwave oscillators and amplifiers 0
- H 546 H2-5 Do you perform tasks on three-cavity klystron microwave oscillators and amplifiers 0
- H 547 H2-6 Do you perform tasks on reflex klystron microwave oscillators and amplifiers 0
- H 548 H2-7 Do you perform tasks on traveling wave tube microwave oscillators and amplifiers 0
- H 549 H2-8 Do you perform tasks on magnetron microwave oscillators and amplifiers 0
- H 550 H2-9 Do you perform tasks on backward wave oscillator 0
- H 551 H2-10 Do you perform tasks on parametric amplifiers 0
- H 552 H2-11 Do you perform tasks on yttrium iron garnet (YIG) tuned microwave oscillators and amplifiers 0

0222 49b. Tune or Adjust 2b

- H 544 H2-3 Do you tune or adjust microwave oscillators or amplifiers 0

0223 49c. Isolate faulty microwave oscillators 2b or amplifiers

- H 543 H2-2 Do you troubleshoot circuits to isolate a faulty microwave oscillator or amplifier 1

0224 50. Resonant Cavities

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0225 50a. Theory of operation B

H 553 H3-1 Do you trace schematic or block diagrams of 1
circuits containing resonant cavities
H 558 H3-6 Do you perform tasks on probe resonant cavities 0
H 559 H3-7 Do you perform tasks on loop resonant cavities 0
H 560 H3-8 Do you perform tasks on aperture (iris/window) 0
resonant cavities

0226 50b. Isolate faulty resonant cavities 2b

H 554 H3-2 Do you troubleshoot circuits to isolate a 1
faulty resonant cavity
H 557 H3-5 Do you measure frequency of resonant cavities 1

0227 50c. Tune/adjust 2b

H 555 H3-3 Do you tune or adjust resonant cavities electrically 1
H 556 H3-4 Do you tune or adjust resonant cavities physically 1

0228 51. Transmitters

0229 51a. Theory of operation

0230 51a(1). Amplitude Modulation -

H 561 H4-1 Do you use "AM" modulation principles 3
H 562 H4-2 Do you trace block diagrams of AM transmitters 3
H 563 H4-3 Do you trace block diagrams of AM transmitter 3
subassemblies or circuit cards
H 564 H4-4 Do you trace schematic diagrams of AM transmitter 3
subassemblies or circuits cards
H 568 H4-8 Do you align or adjust AM transmitters or circuits 3
H 569 H4-9 Do you calculate percentage of modulation for 1
AM transmitters

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0231 51a(2). Frequency Modulation -----

H 593	H4-33	Do you use "FM" modulation principles	4
H 594	H4-34	Do you trace block diagrams of FM transmitters	4
H 595	H4-35	Do you trace block diagrams of FM transmitter subassemblies or circuit cards	3
H 596	H4-36	Do you trace schematic diagrams of FM transmitter subassemblies or circuit cards	3
H 600	H4-40	Do you align or adjust FM transmitters or circuits	3
H 601	H4-41	Do you calculate modulation index for FM transmitters	1
H 602	H4-42	Do you measure frequency deviation for FM transmitters	2

0232 51a(3). Single Side Band -----

H 578	H4-18	Do you trace block diagrams of single side band (SSB) transmitters	2
H 579	H4-19	Do you trace block diagrams of SSB transmitter subassemblies or circuit cards	1
H 580	H4-20	Do you trace schematic diagrams of SSB transmitter subassemblies or circuit cards	1
H 584	H4-24	Do you align or adjust SSB transmitters or circuits	1
H 585	H4-25	Do you calculate percentage of modulation for SSB transmitters	0

0233 51a(4). Pulse Modulation -----

H 612	H4-52	Do you use "PM" modulation principles	2
H 613	H4-53	Do you trace block diagrams of PM transmitters	2
H 614	H4-54	Do you trace block diagrams of PM transmitter subassemblies or circuit cards	2
H 615	H4-55	Do you trace schematic diagrams of PM transmitter subassemblies or circuit cards	2
H 619	H4-59	Do you align or adjust PM transmitters or circuits	2
H 620	H4-60	Do you calculate pulse recurrence time (PRT) or pulse recurrence frequency (PRF) for PM transmitters	0
H 621	H4-61	Do you measure PRT, PRF or pulse width for PM transmitters	1

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0234	51b.	Isolate faulty transmitters	

H 565	H4-5	Do you troubleshoot AM transmitters to major units	3
H 566	H4-6	Do you troubleshoot AM transmitters to subassemblies or circuit cards	3
H 581	H4-21	Do you troubleshoot SSF transmitters to major units	2
H 582	H4-22	Do you troubleshoot SSF transmitters to subassemblies or circuit cards	1
H 597	H4-37	Do you troubleshoot FM transmitters to major units	3
H 598	H4-38	Do you troubleshoot FM transmitters to subassemblies or circuit cards	3
H 616	H4-56	Do you troubleshoot PM transmitters to major units	2
H 617	H4-57	Do you troubleshoot PM transmitters to subassemblies or circuit cards	2

0235	51c.	Troubleshoot circuits	

H 567	H4-7	Do you troubleshoot AM transmitter subassemblies or circuit cards to circuit level components	2
H 583	H4-23	Do you troubleshoot SSF transmitter subassemblies or circuit cards to circuit level components	1
H 599	H4-39	Do you troubleshoot FM transmitter subassemblies or circuit cards to circuit level components	2
H 618	H4-58	Do you troubleshoot PM transmitter subassemblies or circuit cards to circuit level components	2

0236	52.	Receivers	

0237	52a.	Theory of operation	

0238	52a(1).	Amplitude Modulation	

H 570	H4-10	Do you use "AM" demodulation principles	2
H 571	H4-11	Do you trace block diagrams of AM receivers	2
H 572	H4-12	Do you trace block diagrams of AM receiver subassemblies or circuit cards	2

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H 573	H4-13 Do you trace schematic diagrams of AM receiver subassemblies or circuit cards	2
H 577	H4-17 Do you align or adjust AM receivers or circuits	2
0239	52a(2). Frequency Modulation	
H 603	H4-43 Do you use "FM" demodulation principles	3
H 604	H4-44 Do you trace block diagrams of FM receivers	3
H 605	H4-45 Do you trace block diagrams of FM receiver subassemblies or circuit cards	2
H 606	H4-46 Do you trace schematic diagrams of FM receiver subassemblies or circuit cards	2
H 610	H4-50 Do you align or adjust FM receivers or circuits	2
H 611	H4-51 Do you plot receiver signal level curves (RSL) for FM receivers	0
0240	52a(3). Single Side Band	
H 586	H4-26 Do you trace block diagrams of SSB receivers	2
H 587	H4-27 Do you trace block diagrams of SSB receiver subassemblies or circuit cards	1
H 588	H4-28 Do you trace schematic diagrams of SSB receiver subassemblies or circuit cards	1
H 592	H4-32 Do you align or adjust SSB receivers or circuits	1
0241	52a(4). Pulse Modulation	
H 622	H4-62 Do you use "PM" demodulation principles	2
H 623	H4-63 Do you trace block diagrams of PM receivers	2
H 624	H4-64 Do you trace block diagrams of PM receiver subassemblies or circuit cards	2
H 625	H4-65 Do you trace schematic diagrams of PM receiver subassemblies or circuit cards	2
H 629	H4-69 Do you align or adjust PM receivers or circuits	2
0242	52b. Isolate faulty receivers	
H 574	H4-14 Do you troubleshoot AM receivers to major units	2
H 575	H4-15 Do you troubleshoot AM receivers to subassemblies or circuit cards	2
H 589	H4-29 Do you troubleshoot SSB receivers to major units	2

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H 590 H4-30 Do you troubleshoot SSB receivers to sub-
assemblies or circuit cards 1
H 607 H4-47 Do you troubleshoot FM receivers to major units 2
H 608 H4-48 Do you troubleshoot FM receivers to subassemblies
or circuit cards 2
H 626 H4-66 Do you troubleshoot PM receivers to major units 2
H 627 H4-67 Do you troubleshoot PM receivers to subassemblies
or circuit cards 2

0243 52c. Troubleshoot circuits

H 576 H4-16 Do you troubleshoot AM receiver subassemblies 1
or circuit cards to circuit level components
H 591 H4-31 Do you troubleshoot SSB receiver subassemblies 1
or circuit cards to circuit level components
H 609 H4-49 Do you troubleshoot FM receiver subassemblies or 1
circuit cards to circuit level components
H 628 H4-68 Do you troubleshoot PM receiver subassemblies 1
or circuit cards to circuit level components

0244 53. Transmission Power

0245 53a. Perform measurements

I 660 I1-1 Do you measure RF power 3
I 661 I1-2 Do you measure RF peak power 2
I 662 I1-3 Do you measure RF average power 2
I 663 I1-4 Do you measure RF effective power 1
I 664 I1-5 Do you measure RF output power using wattmeters 2

0246 53b. Calculations

I 665 I2-1 Do you calculate RF apparent power 1
I 666 I2-2 Do you calculate RF true power 1
I 667 I2-3 Do you calculate RF power loss or gain in db 3

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0247 54. Antennas

0248 54a. Theory of operation

H 634	H5-5 Do you plot graph radiation patterns	1
H 637	H5-8 Do you work with Yagi antennas	1
H 638	H5-9 Do you work with dipole antennas	3
H 639	H5-10 Do you work with slotted antennas	1
H 640	H5-11 Do you work with rotary antennas	2
H 641	H5-12 Do you work with hertz antennas	0
H 642	H5-13 Do you work with marconi antennas	0
H 643	H5-14 Do you work with rhombic antennas	0
H 644	H5-15 Do you work with scimitar antennas	0
H 645	H5-16 Do you work with parabolic antennas	1
H 646	H5-17 Do you work with ground plane antennas	1
H 647	H5-18 Do you perform tasks on rotary antenna arrays	1
H 648	H5-19 Do you perform tasks on stacked (end fire) antenna arrays	0
H 649	H5-20 Do you perform tasks on broadside antenna arrays	1
H 650	H5-21 Do you perform tasks on cardioid antenna arrays	1
H 651	H5-22 Do you perform tasks on collinear antenna arrays	0
H 652	H5-23 Do you perform tasks on phase antenna arrays	1
H 653	H5-24 Do you perform tasks on planar antenna arrays	0
H 654	H5-25 Do you perform tasks on antennas with vertical polarization	2
H 655	H5-26 Do you perform tasks on antennas with horizontal polarization	2
H 656	H5-27 Do you perform tasks on antennas with circular polarization	1
H 657	H5-28 Do you perform tasks on antennas with unidirectional radiation patterns	3
H 658	H5-29 Do you perform tasks on antennas with bidirectional radiation patterns	3
H 659	H5-30 Do you perform tasks on antennas with omnidirectional radiation patterns	3

0249 54b. Perform alignments

H 630	H5-1 Do you physically align antennas	6
H 631	H5-2 Do you electrically align antennas	3
H 636	H5-7 Do you measure standing wave ratio (SWR) for antennas	1

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0250		54c. Isolate faulty antennas	
H 632		H5-3 Do you troubleshoot loading of antennas	2
H 633		H5-4 Do you troubleshoot coupling of antennas	3
H 635		H5-6 Do you troubleshoot antenna components	3
0251		55. Microphones	
0252		55a. Theory of operation	
J 668		J1-1 Do you trace block diagrams of circuits containing microphones	19
J 669		J1-2 Do you trace schematic diagrams of microphone circuits	18
J 672		J1-5 Do you work on carbon microphones	17
J 673		J1-6 Do you work on capacitor microphones	4
J 674		J1-7 Do you work on crystal microphones	5
J 675		J1-8 Do you work on dynamic microphones	12
J 676		J1-9 Do you work on velocity ribbon microphones	3
0253		55b. Isolate faulty microphones	
J 670		J1-3 Do you troubleshoot to isolate a faulty microphone	21
0254		55c. Troubleshoot circuits	
J 671		J1-4 Do you troubleshoot microphones	11
0255		56. Speakers	
0256		56a. Theory of operation	
J 677		J1-10 Do you trace block diagrams of circuits containing speakers	20

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 T Task 306
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J 678 J1-11 Do you trace schematic diagrams of speaker circuits 18

0257 56b. Isolate faulty speakers -

J 679 J1-12 Do you troubleshoot to isolate a faulty speaker 19

0258 56c. Troubleshoot circuits -

J 680 J1-13 Do you troubleshoot speakers 10

0259 57. Photosensitive Devices

0260 57a. Theory of operation B

J 681 J2-1 Do you trace block diagrams of circuits containing photosensitive devices 3

J 682 J2-2 Do you trace schematic diagrams of photosensitive device circuits 3

J 684 J2-4 Do you adjust or calibrate photosensitive devices 1

J 685 J2-5 Do you work on photodiodes 3

J 686 J2-6 Do you work on phototransistors 2

J 687 J2-7 Do you work on phototubes 0

J 688 J2-8 Do you work on photo-SCRs 0

J 689 J2-9 Do you work on photocells (Photoconductive or Photovoltaic) 1

0261 57b. Isolate faulty photosensitive devices 2b

J 683 J2-3 Do you troubleshoot to isolate a faulty photosensitive device 3

0262 58. Display Tubes

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 T Task 306
 Y Nbr 50

Task Title

0263 58a. Theory of operation

J 690 J3-1 Do you trace block diagrams of circuits containing display tubes 0
 J 691 J3-2 Do you trace schematic diagrams of display tubes or circuits 0
 J 693 J3-4 Do you adjust or calibrate display tubes or circuits 0
 J 694 J3-5 Do you work on direct view storage tubes (DVST) 0
 J 695 J3-6 Do you work on multiple mode storage tubes (MMST) 0
 J 696 J3-7 Do you work on scan converter tubes (SCT) 0

0264 58b. Isolate faulty display tubes

J 692 J3-3 Do you troubleshoot to isolate a faulty display tube 0

0265 59. Support Subjects

0266 59a. Safety applicable to electronics B

0267 59b. First aid for electrical shock B

0268 59c. Electrostatic Discharge (ESD) Control B

0269 Tasks not referenced

B 175 B3-4 Do you use audio sine-wave signal generators 54
 B 176 B3-5 Do you use audio non-sinusoidal signal generators 17
 B 177 B3-6 Do you use RF less than 1,000MH signal generators 19
 B 178 B3-7 Do you use RF greater than 1,000MH signal generators 9
 B 179 B3-8 Do you use white noise signal generators 7
 B 180 B3-9 Do you use pattern signal generators 33

PM0011

PRTMOD DAFSC 30650 EPI Data Matched to EF/A SYS

D T Y	Task Title	306 50
B 181	B3-10 Do you use pseudo-random signal generators	12
B 182	B3-11 Do you use time mark signal generators	11
B 183	B3-12 Do you use multi-function (square/sine/triangular) signal generators	34
B 184	B3-13 Do you use TV signal signal generators	3
D 284	D1-10 Do you perform tasks on voltage multipliers (doubblers/triplers)	40
D 285	D1-11 Do you perform tasks on DC to DC converters	60
D 286	D1-12 Do you perform tasks on inverters (DC to AC converters)	46
D 287	D1-13 Do you perform tasks on switching power supplies	16
J 697	J4-1 Do you trace block diagrams of TV systems or subassemblies	0
J 698	J4-2 Do you trace schematic diagrams of TV systems or component circuits	0
J 699	J4-3 Do you troubleshoot TV systems to major subassemblies	0
J 700	J4-4 Do you troubleshoot TV systems to circuit level components	0
J 701	J4-5 Do you adjust or calibrate TV systems or components	0
J 702	J4-6 Do you trace block diagrams of laser systems or subassemblies	0
J 703	J4-7 Do you trace schematic diagrams of laser systems or component circuits	0
J 704	J4-8 Do you troubleshoot laser systems to major subassemblies	0
J 705	J4-9 Do you troubleshoot laser systems to circuit level components	0
J 706	J4-10 Do you adjust or calibrate laser systems or components	0
J 707	J4-11 Do you trace block diagrams of infrared systems or subassemblies	1
J 708	J4-12 Do you trace schematic diagrams of infrared systems or component circuits	0
J 709	J4-13 Do you troubleshoot infrared systems to major subassemblies	0
J 710	J4-14 Do you troubleshoot infrared systems circuit level components	0
J 711	J4-15 Do you inspect, clean, or service infrared systems or components	1
J 712	J4-16 Do you adjust or calibrate infrared systems or components	0

Report Option Table for Modules

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Report Option Table for Tasks

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Description of Reported Module Factors

Col	Factor	Source vector	Title	Number Members	Mean	S.D.	Based on All Tasks Within Range	Max	Min	Valid
1	TITLE		Module Statement							

Description of Reported Task Factors

Col	Factor	Source vector	Title	Number Members	Mean	S.D.	Based on All Tasks Within Range	Max	Min	Valid
1	TITLE		Task Statement							
2	F0083	GP0089/PHP	All DAFSC 30650	235	24.48	25.37	97.45	.00		712

Electronic Principles Inventory (EPI) data for Air Force specialties is presented below in matched to POI L3ABR30630, dated 22 Sep 86 order. Data for this report was collected from job incumbents during the period September 1987 - April 1988

Percent members responding "YES" is shown for each specialty listed.

For assistance in using this EPI printout phone USAFOMC/OMYA, at AUTOVON 487-6811.

D			
T Ysk			306
Y Nbr		Task Title	50

0001 POI L3ABR30630 002 ELECTRONIC CRYPTOGRAPHIC
 COMMUNICATIONS EQUIPMENT SPECIALIST
 Dated 22 Sep 86 AIR FORCE MILITARY TRAINING CENTER

0002 I. DC Circuits

0003 I 1. Orientation

1.0

0004 I 1a. Be briefed on applicable portions of
 ZZI 0040. SIS: None Meas: None

0005 I 2. Operation

9

0006 I 2a. Using powers of ten, solve for the unknown value,
 with 3 out of 5 correct. SIS: 19a Meas: W (3)

D
T Task 306
Y Nbr 50

Task Title

0007 I 2b. Given numerical values, convert them to selected metric prefixes, with 3 out of 5 correct.
STS: 19a Meas: W (4)

A 1 A1-1 Do you use metric terms (example milli, kilo, mega) 73

0008 I 3. DC Circuits 13

0009 I 3a. Given 10 representations of differences of potential, draw the direction of current flow, with 7 out of 10 correct. STS: 19a Meas: W (4)

A 2 A1-2 Do you use basic DC electrical/electronic terms 97

0010 I 3b. Given 5 resistors, identify the ohmic value of each using the color, with 4 out of 5 correct. STS: 19a Meas: W (5)

A 1 A1-1 Do you use metric terms (example milli, kilo, mega) 73

A 13 A1-13 Do you determine ohmic value of a resistor using the color code 75

0011 I 3c. Given 5 resistors, use the multimeter measure the ohmic value of each + or - 10%, with 4 out of 5 correct, with a maximum time of 15 minutes. STS: 18a, 18b(2), 7c(1) Meas: P (4)

A 14 A1-14 Do you ohm check resistors 83

B 159 B1-7 Do you use the multimeter to measure circuit resistance 74

B 160 B1-8 Do you use the multimeter to measure component resistance 85

B 188 B4-4 Do you use digital multimeters 95

D 306
T Task 50
Y Nbr

Task Title

0012 I 5. Series Circuits

15

0013 I 5a. Given 2 schematic drawings of series resistive circuits, solve for 10 specific values in each drawing, with 12 out of 20 correct. STS: 19a Meas: W (7)

- A 1 A1-1 Do you use metric terms (example milli, kilo, mega) 73
- A 4 A1-4 Do you trace schematic or block diagrams of circuits containing conductors, fuses, lamps, switches, or batteries 93
- A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power 45
- A 9 A1-9 Do you trace schematic or block diagrams of circuits containing resistors 89

0014 I 5b. Using a trainer and a multimeter, measure 5 unknown values of voltage/current in a series resistive circuit + or - 5%, with 4 out of 5 correct, with a maximum time of 30 minutes. STS: 18b(2), 7c(1) Meas: P (3)

- B 153 B1-1 Do you use the multimeter to measure DC voltage values 97
- B 156 B1-4 Do you use the multimeter to measure DC current values 77

0015 I 5c. Given a schematic drawing of a series resistive circuit with theoretical malfunctions, identify the relationship between current, voltage and resistance, with 3 out of 4 correct. STS: 19b(1) Meas: W (3)

- A 5 A1-5 Do you troubleshoot circuits containing conductors, fuses, lamps, switches, or batteries 94

D Task 306
Y Nbr 50

Task Title

0016 I 5d. Using a trainer and a multimeter, identify malfunctioning components and conditions in series resistive circuits, with 4 out of 5 correct, with a time limit of 10 minutes for each problem.
STS: 19b(1) Meas: P (2)

A 10 A1-10 Do you troubleshoot circuits to isolate a faulty resistor 84
A 14 A1-14 Do you ohm check resistors 83

0017 I 7. Parallel Circuits 12

0018 I 7a. Given 2 schematic drawings of parallel resistive circuits, select 6 for 10 specified values in each drawing, with 12 out of 20 correct. STS: 19a Meas: W (6)

A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power 45
A 9 A1-9 Do you trace schematic or block diagrams of circuits containing resistors 89

0019 I 7b. Given a schematic drawing of a parallel resistive circuit with theoretical malfunctions, identify the relationships between current, voltage and resistance, with 3 out of 4 correct. STS: 19b(2) Meas: W (3)

A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power 45

0020 I 7c. Using a trainer and a multimeter, identify malfunctioning components and conditions in parallel resistive circuits, with 4 out of 5 correct, with a time limit of 10 minutes for each problem.
STS: 19b(2) Meas: P (3)

A 10 A1-10 Do you troubleshoot circuits to isolate a faulty resistor 84

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Task Title

A 14 A1-14 Do you ohm check resistors 83

0021 I 9. Series-Parallel Circuits 14

0022 I 9a. Given a schematic drawing of a series-parallel resistive circuit, solve for 20 specified values, with 12 out of 20 correct. STS: 19b(3) Meas: W (8)

A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power 45

A 9 A1-9 Do you trace schematic or block diagrams of circuits containing resistors 89

0023 I 9b. Given a schematic drawing of a series-parallel resistive circuit with theoretical malfunctions, identify the relationships between current, voltage and resistance, with 4 out of 5 correct. STS: 19b(3) Meas: W (3)

A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power 45

0024 I 9c. Using a trainer and a multimeter, identify malfunctioning components and conditions in series-parallel resistive circuits, with 4 out of 5 correct, with a time limit of 10 minutes for each problem. STS: 19b(3) Meas: P (3)

A 10 A1-10 Do you troubleshoot circuits to isolate a faulty resistor 84

A 14 A1-14 Do you ohm check resistors 83

0025 II. AC Circuits

D Task Title 306
 T Task 50
 Y Nbr

0026 II 1. AC Circuits 5

0027 II 1a. Given a list of terms and a list of definitions concerning alternating current and alternating voltage, match the term with its definition, with 9 out of 12 correct. STS: 19a Meas: W (3)

A 3 A1-3 Do you use basic AC electrical/electronic terms 95

0028 II 1b. Given the period or frequency of an AC signal, calculate the unknown values, with 4 out of 5 correct. STS: 19a Meas: W (2)

A 7 A1-7 Do you calculate values of AC effective voltage, average voltage, or peak-to-peak voltage 45

A 8 A1-8 Do you calculate values of frequency, phase relationship, or wave length 46

0029 II 2. Test Equipment 15

0030 II 2a. Using a signal generator and oscilloscope, adjust the controls necessary to display specified signals on the oscilloscope, + or - 5%, with 3 out of 4 correct, with a time limit of 5 minutes for each signal. STS: 18a, 18b(1), 18b(5) Meas: P

B 154 B1-2 Do you use the multimeter to measure AC voltage values 94

B 157 B1-5 Do you use the multimeter to measure AC current values 70

B 161 B2-1 Do you use the oscilloscope to measure time to determine frequency 74

B 162 B2-2 Do you use the oscilloscope to measure time (rise, fall, pulse width, etc) 76

B 163 B2-3 Do you use the oscilloscope to measure AC voltage 86

B 164 B2-4 Do you use the oscilloscope to measure DC voltage 90

B 167 B2-7 Do you use the oscilloscope to observe signal/data patterns 89

D	T	Y	Nbr	Task Title	306	50
B	170			B2-10 Do you use attenuator probes with oscilloscopes	69	
B	172			B3-1 Do you use signal generators (SG) to perform operational checks	60	
B	174			B3-3 Do you use SG to troubleshoot circuits	58	
B	183			B3-12 Do you use multi-function (square/sine/triangular) signal generators	34	

0031 II 4. Inductive Reactance 15

0032 II 4a. Given 2 schematic drawings of inductive circuits, solve for 10 specified values in each drawing, with 12 out of 20 correct. SIS: 19a Meas: W

A	8	Al-8 Do you calculate values of frequency, phase relationship, or wave length	46
A	11	Al-11 Do you calibrate or adjust circuits by using variable resistors	83
A	20	Al-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils	67
A	21	Al-21 Do you troubleshoot circuits to isolate a faulty inductor, choke, or choke coil	65
A	22	Al-22 Do you calculate values of circuit total inductance	23
A	23	Al-23 Do you calculate values of circuit or component inductive reactance	21
A	24	Al-24 Do you calculate values of circuit voltage or current in circuits containing inductors	26
A	26	Al-26 Do you ohm check inductors	57
B	169	B2-9 Do you use the oscilloscope to observe phase relationships	66
F	359	F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	47
F	360	F3-2 Do you trace schematic diagrams of WSC	46
F	367	F3-9 Do you perform tasks on RL differentiating WSC	21
F	369	F3-11 Do you perform tasks on RL integrating WSC	20

0033 II 5. Capacitive Reactance 15

D	Tsk	Nbr
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306
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Task Title

0034 II 5a. Given 2 schematic drawings of capacitive circuits, solve for 10 specified values in each drawing, with 12 out of 20 correct. STS: 19a
Meas: W

A 8	Al-8 Do you calculate values of frequency, phase relationship, or wave length	46
A 11	Al-11 Do you calibrate or adjust circuits by using variable resistors	83
A 27	Al-27 Do you trace schematic or block diagrams of circuits containing capacitors	85
A 28	Al-28 Do you troubleshoot circuits to isolate a faulty capacitor	83
A 29	Al-29 Do you calculate values of circuit total capacitance	31
A 30	Al-30 Do you calculate values of circuit or component capacitive reactance	27
A 31	Al-31 Do you calculate values of circuit or component voltage or current in circuits containing capacitors	31
A 33	Al-33 Do you ohm check capacitors	78
F 366	F3-8 Do you perform tasks on RC differentiating WSC	24
F 368	F3-10 Do you perform tasks on RC integrating WSC	21

0035 II 6. Filters, Transformers and Relays 24

00036 II 6a. Given schematic drawings of RC and RL filters, identify the configuration of each, with 3 out of 4 correct. STS: 19a MEAS: W (5)

0037 II 6b. Given schematic drawings of RCL filters, identify the configuration of each, with 3 out of 4 correct. STS: 19a Meas: W

D
T Task 306
Y Nbr 50

Task Title

0039 II 6d. Using a trainer and test equipment,
identify the malfunctioning transformer windings
and conditions, with 3 out of 4 correct, with a
time limit of 10 minutes for each problem.
STS: 19c Meas: P (8)

A 15 A1-15 Do you trace schematic or block diagrams of circuits 79
containing relays
A 35 A1-35 Do you trace schematic or block diagrams of circuits 80
containing transformers
A 36 A1-36 Do you troubleshoot circuits to isolate a faulty 77
transformer
A 37 A1-37 Do you calculate transformer voltage or current 35
step-up or step-down ratios
A 38 A1-38 Do you calculate impedance of transformers 22
A 40 A1-40 Do you ohm check transformers 65
A 41 A1-41 Do you measure transformer output voltage 73
A 104 A3-22 Do you perform tasks on zener diodes 69

0040 III. Solid State Devices

0041 III 1. PN Junctions 13

0042 III 1a. Given schematic drawings of limiters
with a specified input, identify the output
and type limiter with 6 out of 8 correct.
STS: 19a Meas: W (9)

A 83 A3-1 Do you trace schematic or block diagrams of circuits 81
containing diodes
A 87 A3-5 Do you use diode substitution information 39
F 374 F4-2 Do you trace schematic diagrams of limiter circuits 43
F 376 F4-4 Do you trace schematic diagrams of clamper circuits 37
F 381 F4-9 Do you perform tasks on series diode limiter circuits 38
F 382 F4-10 Do you perform tasks on shunt diode limiter circuits 36
F 383 F4-11 Do you perform tasks on bias limiter circuits 22
F 384 F4-12 Do you perform tasks on zener diode circuits 41
F 387 F4-15 Do you perform tasks on diode clamper circuits 35
F 388 F4-16 Do you perform tasks on bias clamper circuits 22

D
T Task 306
Y Nbr 50

Task Title

0043 III 1b. Using a trainer and test equipment,
determine the malfunctioning components and
conditions in limiter circuits with 3 out of 4
correct, with a time limit of 10 minutes for
each problem. STS: 19b(3) Meas: P (4)

A 84 A3-2 Do you troubleshoot circuits to isolate a faulty diode 80
A 85 A3-3 Do you check diodes using an ohmmeter 78
A 88 A3-6 Do you use diode color codes 30
F 377 F4-5 Do you troubleshoot to isolate a faulty limiter circuit 40
F 378 F4-6 Do you troubleshoot limiters to circuit level 37
components

0044 III 3. Transistor Amplifiers 48

0045 III 3a. Given schematic drawings of transistor
amplifiers, identify the output wave form,
function, or operational characteristics,
with 9 out of 12 correct. STS: 19a Meas: W (21)

A 11 A1-11 Do you calibrate or adjust circuits by using 83
variable resistors
A 89 A3-7 Do you trace schematic or block diagrams of circuits 85
containing transistors
C 199 C1-1 Do you trace block diagrams of circuits containing 69
transistor amplifiers
C 200 C1-2 Do you trace schematic diagrams of transistor 69
amplifier circuits
C 206 C1-8 Do you calculate values of transistor amplifier 25
voltage, current or power gain
C 210 C1-12 Do you work on push-pull transistor amplifiers 50
C 218 C2-1 Do you trace schematic diagrams of amplifier 34
stabilization circuits
C 220 C2-3 Do you perform tasks on emitter (swamping) resistor 26
stabilization amplifiers
C 221 L2-4 Do you perform tasks on self-bias stabilization 25
amplifiers
C 249 C5-1 Do you trace block or schematic diagrams of circuits 40
containing operational amplifiers (op amps)
C 251 C5-3 Do you calculate op amp gain 13
C 253 C5-5 Do you use or apply operational amplifiers for 36
general purpose (inverting or non-inverting)

D	T	Task Title	306
Y	Nbr		50
C 254		C5-6 Do you use or apply operational amplifiers as differential/comparators	18
C 260		C5-12 Do you use or apply operational amplifiers for differentiators	13

0046 III 3b. Using a trainer and test equipment, identify the malfunctioning components and conditions in a 4-stage transistor amplifier with 6 out of 8 correct, with a time limit of 15 minutes for each problem. STS: 19b(3) Meas: P (27)

A 33	A1-33	Do you ohm check capacitors	78
A 90	A3-8	Do you troubleshoot circuits to isolate a faulty transistor	84
A 91	A3-9	Do you check transistors using an ohmmeter	82
C 201	C1-3	Do you troubleshoot to isolate a faulty transistor amplifier	68
C 202	C1-4	Do you troubleshoot transistor amplifiers to circuit level components	64
C 203	C1-5	Do you troubleshoot transistor amplifier distortion	36
C 205	C1-7	Do you measure transistor amplifier voltage, current, or power gain	47
C 208	C1-10	Do you work on cascade-connected transistor amplifiers	23
C 211	C1-13	Do you work on audio transistor amplifiers	50
C 219	C2-2	Do you troubleshoot amplifier stabilization circuits to circuit level components	33
C 225	C3-1	Do you trace block diagrams of circuits containing coupling circuits	46
C 226	C3-2	Do you trace schematic diagrams of coupling circuits	46
C 227	C3-3	Do you troubleshoot circuits to isolate a faulty coupling circuit	44
C 228	C3-4	Do you troubleshoot coupling circuits to circuit level components	40
C 229	C3-5	Do you perform tasks on direct coupling circuits	43
C 230	C3-6	Do you perform tasks on capacitive-resistive coupling circuits	37
C 231	C3-7	Do you perform tasks on capacitive-inductive coupling circuits	33
C 232	C3-8	Do you perform tasks on transformer coupling circuits	38

0047 III 5. Unique Solid Devices

14

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T Task 306
Y Nbr 50

Task Title

0048 III 5a. Given schematic drawings of unique solid state devices, identify the output wave forms, functions, or operational characteristics, with 6 out of 8 correct. STS: 19a Meas: W

A 98 A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices 54
A 102 A3-20 Do you perform tasks on field effect transistors (FET) 36
A 103 A3-21 Do you perform tasks on unijunction transistors (UJT) 45
A 104 A3-22 Do you perform tasks on zener diodes 69
A 109 A3-27 Do you perform tasks on silicon controlled rectifiers (SCR) 49
C 222 C2-5 Do you perform tasks on thermistor stabilization amplifiers 26
F 359 F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC) 47
F 360 F3-2 Do you trace schematic diagrams of WSC 46
F 363 F3-5 Do you adjust or calibrate WSC 32
F 364 F3-6 Do you perform tasks on sawtooth wave generator WSC 39

0049 IV. Basic Circuits

0050 IV 1. Power Supplies 26

0051 IV 1a. Given schematic drawings of a power supply, identify the output waveform at a specified test points, functions, or operational characteristics, with 7 out of 10 correct. STS: 19c Meas: W (110)

A 35 A1-35 Do you trace schematic or block diagrams of circuits containing transformers 80
D 275 D1-1 Do you trace block diagrams of circuits containing power supplies 86
D 276 D1-2 Do you trace schematic diagrams of power supply circuits 85
D 280 D1-6 Do you perform tasks on half-wave rectifier power supplies 67
D 281 D1-7 Do you perform tasks on full-wave rectifier power supplies 72

D T Y	Task Title	306 50
D 282	D1-8 Do you perform tasks on full-wave bridge rectifier power supplies	74
D 284	D1-10 Do you perform tasks on voltage multipliers (doublers/triplers)	40
D 288	D2-1 Do you trace block diagrams of circuits containing power supply filters	68
D 289	D2-2 Do you trace schematic diagrams of power supply filters	67
D 292	D2-5 Do you perform tasks on capacitive power supply filters	60
D 293	D2-6 Do you perform tasks on inductive power supply filters	52
D 294	D2-7 Do you perform tasks on L-type power supply filters	34
D 295	D2-8 Do you perform tasks on Pi-type power supply filters	29
D 296	D2-9 Do you perform tasks on T-type power supply filters	26
D 297	D2-10 Do you perform tasks on resistive capacitive (RC) power supply filters	59
D 298	D2-11 Do you perform tasks on inductive capacitive (LC) power supply filters	54
D 299	D3-1 Do you trace block diagrams of circuits containing power supply voltage regulators	70
D 300	D3-2 Do you trace schematic diagrams of power supply voltage regulator circuits	69
D 308	D3-10 Do you perform tasks on transistor series power supply voltage regulators with current limiting	29

0052	IV lb. Using a trainer and test equipment, identify the malfunctioning components and conditions in a power supply, with 4 out of 5 correct, with a time limit of 10 minutes for each problem. SIS: 19c, 7c(1) Meas: P	(16)
A 83	A3-1 Do you trace schematic or block diagrams of circuits containing diodes	81
A 84	A3-2 Do you troubleshoot circuits to isolate a faulty diode	80
A 85	A3-3 Do you check diodes using an ohmmeter	78
A 89	A3-7 Do you trace schematic or block diagrams of circuits containing transistors	85
A 90	A3-8 Do you troubleshoot circuits to isolate a faulty transistor	84
A 91	A3-9 Do you check transistors using an ohmmeter	82
B 165	B2-5 Do you use the oscilloscope to measure ripple voltages	87
D 277	D1-3 Do you troubleshoot circuits to isolate a faulty power supply	88
D 278	D1-4 Do you troubleshoot power supplies to circuit level components	81
D 279	D1-5 Do you align or adjust power supplies	87
D 290	D2-3 Do you troubleshoot circuits to isolate a faulty power supply filter	66

D	Task Title	306
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D 291	D2-4 Do you troubleshoot power supply filters to circuit level components	58
D 301	D3-3 Do you troubleshoot circuits to isolate a faulty power supply voltage regulator	68
D 302	D3-4 Do you troubleshoot power supply voltage regulators to circuit level components	65

0053 IV 3. Oscillators 10

0054 IV 3a. Given schematic drawings of oscillators, identify characteristics and functional operations, with 7 out of 10 correct. STS: 19a Meas: W (5)

A 20	A1-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils	67
A 35	A1-35 Do you trace schematic or block diagrams of circuits containing transformers	80
D 286	D1-12 Do you perform tasks on inverters (DC to AC converters)	46
F 327	F1-1 Do you trace block diagrams of circuits containing oscillators	67
F 328	F1-2 Do you trace schematic diagrams of oscillator circuits	66
F 331	F1-5 Do you align or adjust oscillator circuits	62
F 332	F1-6 Do the oscillators you work with use LC tank circuits	42
F 333	F1-7 Do the oscillators you work with use RC networks	40
F 334	F1-8 Do the oscillators you work with use crystals	65
F 336	F1-10 Do you perform tasks on series Hartley oscillator circuits	29
F 337	F1-11 Do you perform tasks on shunt Hartley oscillator circuits	28
F 338	F1-12 Do you perform tasks on Colpitts oscillator circuits	26

0055 IV 3b. Given schematic drawings of non-sinusoidal circuits, identify characteristics and functional operations, with 6 out of 8 correct. STS: 19a Meas: W (5)

F 347	F2-1 Do you trace block diagrams of circuits containing multivibrators	64
F 348	F2-2 Do you trace schematic diagrams of multivibrator circuits	63
F 351	F2-5 Do you adjust or align multivibrator circuits	33
F 353	F2-7 Do the multivibrators you work with use RC networks	43

D	T	Task Title	306
Y	Nbr		50
F 355		F2-9 Do you perform tasks on astable (free running) multivibrators	58
F 356		F2-10 Do you perform tasks on monostable (one shot) multivibrators	63
F 357		F2-11 Do you perform tasks on bistable (flip flop) multivibrators	65
F 372		F3-14 Do you perform tasks on Schmitt trigger WSC	46
G 428		G1-40 Do you perform tasks related to Schmidt triggers	51
G 429		G1-41 Do you perform tasks related to delay (One-shot) logic functions	51

0056 V. Logic and Integrated Circuits

0057 V 1. Integrated Circuits

9

0058 V 1a. Given a list of terms and a list of definitions concerning IC principles, match the term to the definition with 7 out of 10 correct. STS: 19e Meas: W (4)

G 438	G1-50 Do you perform tasks on RTL (resistor transistor logic formally DCIL)	16
G 439	G1-51 Do you perform tasks on DTL (diode transistor logic)	21
G 440	G1-52 Do you perform tasks on TTL (transistor transistor logic)	26
G 441	G1-53 Do you perform tasks on ECL/CML (emitter coupled or current mode logic)	7
G 443	G1-55 Do you perform tasks on CMOS (complementary metal oxide semiconductor)	21

0059 V 1b. Given a schematic drawing of gating circuits, identify the output waveform at specified test points with 4 out of 5 correct. STS: 19e Meas: W (3)

A 95	A3-13 Do you trace schematic or block diagrams of circuits containing integrated circuits (IC)	74
A 104	A3-22 Do you perform tasks on zener diodes	69
G 412	G1-24 Do you trace data flow through logic symbol diagrams	57
G 413	G1-25 Do you trace data flow through logic schematic diagrams	57
G 419	G1-31 Do you perform tasks related to AND gates	63

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G 420			G1-32 Do you perform tasks related to OR gates	63
G 421			G1-33 Do you perform tasks related to inhibited gates	47
			logic functions	
G 422			G1-34 Do you perform tasks related to NAND or NOR gates	62
G 423			G1-35 Do you perform tasks related to exclusive OR/NOR	60
			logic functions	
0060			V 1c. Using a trainer and test equipment, identify malfunctioning components in integrated circuits; with 4 out of 5 correct, with a time limit of 10 minutes for each problem. STS: 19e Meas: P (2)	
A 96			A3-14 Do you troubleshoot circuits to isolate a faulty IC	69
A 104			A3-22 Do you perform tasks on zener diodes	69
G 415			G1-27 Do you troubleshoot digital systems subassemblies or circuit cards	57
G 416			G1-28 Do you troubleshoot digital systems, subsystems or circuit cards to circuit level components or IC	48
G 417			G1-29 Do you trace data flow through circuits using positive logic (High = Binary 1)	49
G 418			G1-30 Do you trace data flow through circuits using negative logic (High = Binary 0)	44
G 435			G1-47 Do you develop Boolean equations from logic circuits or diagrams	17
0061			V 3. Logic Circuits	22
0062			V 3a. Given schematic drawings of flip-flop circuits, identify functions and operational characteristics with 6 out of 8 correct. STS: 19d Meas: W (8)	
B 161			B2-1 Do you use the oscilloscope to measure time to determine frequency	74
G 389			G1-1 Do you convert decimal numbers to binary numbers or binary numbers to decimal	22
G 424			G1-36 Do you perform tasks related to RS flip flops	34
G 425			G1-37 Do you perform tasks related to D(Data) flip flops	43
G 426			G1-38 Do you perform tasks related to T(Toggle) flip flops	40
G 427			G1-39 Do you perform tasks related to JK flip flops	27
G 432			G1-44 Do you perform tasks related to inverters	53
G 488			G3-1 Do you trace data flow through circuits containing counters	54
G 491			G3-4 Do you perform tasks on UP counters in logic circuits	43

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G 492	G3-5 Do you perform tasks on DOWN counters in logic circuits	41
G 493	G3-6 Do you perform tasks on DECADE counters in logic circuits	24
G 494	G3-7 Do you perform tasks on ring counters in logic circuits	26
G 495	G3-8 Do you perform tasks on modulus counters in logic circuits	20
G 496	G3-9 Do you perform tasks on synchronous (parallel) counters in logic circuits	47
G 497	G3-10 Do you perform tasks on asynchronous (serial) counters in logic circuits	46
G 498	G3-11 Do you trace logic diagrams of circuits containing registers	49
G 501	G3-14 Do you perform tasks on shift registers in logic circuits	50
G 502	G3-15 Do you perform tasks on storage registers in logic circuits	43
G 503	G3-16 Do you trace data flow through combinational logic circuits	39
G 506	G3-19 Do you perform tasks on encoders	42
G 507	G3-20 Do you perform tasks on decoders	42

0063 V 3b. Using a trainer and test equipment, identify malfunctioning components and conditions in a logic circuit, with 4 out of 5 correct, with a time limit of 10 minutes for each problem. STS: 19d, 7c(1) Meas: P (14)

A 104	A3-22 Do you perform tasks on zener diodes	69
A 107	A3-25 Do you perform tasks on light emitting diodes (LED)	49
B 161	B2-1 Do you use the oscilloscope to measure time to determine frequency	74
B 162	B2-2 Do you use the oscilloscope to measure time (rise, fall, pulse width, etc)	76
G 489	G3-2 Do you troubleshoot counter circuits to isolate a faulty counter	53
G 490	G3-3 Do you troubleshoot counters to circuit level components	50
G 499	G3-12 Do you troubleshoot circuits containing registers to isolate a faulty register	47
G 500	G3-13 Do you troubleshoot registers to circuit level components	43
G 504	G3-17 Do you troubleshoot to isolate a faulty combinational logic circuit	38
G 505	G3-18 Do you troubleshoot combinational logic circuits to circuit level components	34

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0064 V 6. Soldering

0065 V 6a. Given a list of hazards of the electronics career field and a list precautions against those hazards, match the precaution to the hazard, with 4 out of 5 correct. SIS: 7a, 7c(2) Meas: W (1)

0066 V 6b. Given appropriate tools, use correct soldering procedures to remove, replace or repair detail parts.
SYS: 10f. 7c(2) Meas: P (6)

A 141	A5-1 Do you solder or desolder hardware connections	96
A 142	A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc	88
A 143	A5-3 Do you solder or desolder printed circuit board connections	81
A 145	A5-5 Do you perform high reliability soldering	67

0067 V 6c. Apply safety precaution during soldering operations. STS: 7c(2) Meas: P (1)

Tasks not referenced for duty A,
GENERAL ELECTRONIC/ELECTRICITY

A 12	Al-12 Do you calculate the value of a resistor required for a circuit	48
A 16	Al-16 Do you troubleshoot circuits to isolate a faulty relay	78
A 17	Al-17 Do you adjust relays	41
A 18	Al-18 Do you perform tasks on contacts, cores, coils, armatures, or springs	43
A 19	Al-19 Do you continuity check relays	58
A 25	Al-25 Do you calibrate or adjust circuits by using variable inductors	43
A 32	Al-32 Do you calibrate or adjust circuits using variable capacitors	43

D	T	Y	Task Title	306
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A	34		Al-34 Do you use capacitor color codes in your present job	23
A	39		Al-39 Do you calibrate or adjust circuits using variable transformers	25
A	42		Al-42 Do you trace schematic or block diagrams of circuits containing three phase transformers	29
A	43		Al-43 Do you troubleshoot circuits to isolate a faulty three phase transformer	27
A	44		Al-44 Do you adjust three phase transformers	17
A	45		A2-1 Do you trace schematic or block diagrams of circuits containing DC motors	23
A	46		A2-2 Do you troubleshoot circuits to isolate a faulty DC motor	23
A	47		A2-3 Do you troubleshoot DC motor component parts	13
A	48		A2-4 Do you perform tasks on DC motor component parts	14
A	49		A2-5 Do you trace schematic or block diagrams of circuits containing AC motors	23
A	50		A2-6 Do you troubleshoot circuits to isolate a faulty AC motor	22
A	51		A2-7 Do you troubleshoot AC motor component parts	11
A	52		A2-8 Do you perform tasks on AC motor component parts	14
A	53		A2-9 Do you trace schematic or block diagrams of circuits containing DC generators	4
A	54		A2-10 Do you troubleshoot to isolate a faulty DC generator	4
A	55		A2-11 Do you troubleshoot DC generator component parts	4
A	56		A2-12 Do you perform tasks on component parts of DC generators	4
A	57		A2-13 Do you trace schematic or block diagrams of circuits containing AC generators	4
A	58		A2-14 Do you troubleshoot circuits to isolate a faulty AC generator	4
A	59		A2-15 Do you troubleshoot AC generator component parts	3
A	60		A2-16 Do you perform tasks on component parts of AC generators	3
A	61		A2-17 Do you trace schematic or block diagrams of circuits containing alternators	2
A	62		A2-18 Do you troubleshoot circuits to isolate a faulty alternator	1
A	63		A2-19 Do you troubleshoot alternator component parts	1
A	64		A2-20 Do you perform tasks on component parts of alternators	1
A	65		A2-21 Do you trace schematic or block diagrams of circuits containing synchros or servos	7
A	66		A2-22 Do you troubleshoot circuits to isolate a faulty synchro or servo	7
A	67		A2-23 Do you troubleshoot synchro or servo component parts	6
A	68		A2-24 Do you perform tasks on component parts of synchros or servos	6
A	69		A2-25 Do you trace schematic or block diagrams of circuits containing choppers	2

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A 70	A2-26 Do you troubleshoot circuits to isolate a faulty chopper	2
A 71	A2-27 Do you measure chopper coil excitation frequency	1
A 72	A2-28 Do you measure chopper coil voltage-current phase relationship	1
A 73	A2-29 Do you trace schematic or block diagrams of circuits containing transducers	3
A 74	A2-30 Do you troubleshoot circuits to isolate a faulty transducer	4
A 75	A2-31 Do you calibrate or adjust transducers	3
A 76	A2-32 Do you repair, clean or lubricate transducers	3
A 77	A2-33 Do you trace schematic or block diagrams of circuits containing solenoids	7
A 78	A2-34 Do you troubleshoot circuits to isolate a faulty solenoid	7
A 79	A2-35 Do you perform maintenance on solenoid component parts	4
A 80	A2-36 Do you trace schematic or block diagrams of circuits containing meter movements	27
A 81	A2-37 Do you troubleshoot circuits to isolate a faulty meter movement	26
A 82	A2-38 Do you perform maintenance on meter movement mechanical parts	12
A 86	A3-4 Do you use diode characteristic curves	16
A 92	A3-10 Do you check transistors using transistor testers	50
A 93	A3-11 Do you use transistor characteristic curves	16
A 94	A3-12 Do you use transistor substitution information	40
A 97	A3-15 Do you use IC substitution information	36
A 99	A3-17 Do you troubleshoot circuits to isolate a faulty solid-state special purpose device	51
A 100	A3-18 Do you perform tasks on varactors/varicaps	28
A 101	A3-19 Do you perform tasks on tunnel diodes	23
A 105	A3-23 Do you perform tasks on liquid crystal displays (LCD)	26
A 106	A3-24 Do you perform tasks on pin diodes	17
A 108	A3-26 Do you perform tasks on fantail transistors	12
A 110	A3-28 Do you perform tasks on triacs	9
A 111	A3-29 Do you perform tasks on programmable unijunction transistors (PUT)	7
A 112	A3-30 Do you perform tasks on silicon controlled switches (SCS)	12
A 113	A3-31 Do you perform tasks on silicon unilateral switches (SUS)	6
A 114	A3-32 Do you perform tasks on step recovery diodes (SRD)	7
A 115	A3-33 Do you perform tasks on field effect diodes (FED)	14
A 116	A3-34 Do you perform tasks on DIAC (Bi-directional trigger diode)	6
A 117	A3-35 Do you perform tasks on varistors	51
A 118	A3-36 Do you perform tasks on metal oxide varistors (MOV)	7
A 119	A3-37 Do you perform tasks on schottky diodes	5
A 120	A4-1 Do you trace block diagrams of circuits containing electron tubes	32

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D	T	Task Title	306
Y	Nbr		50
A	121	A4-2 Do you trace schematic diagrams of electron tube circuits	31
A	122	A4-3 Do you troubleshoot circuits to isolate a faulty electron tube	31
A	123	A4-4 Do you use electron tube characteristic curves	8
A	124	A4-5 Do you use electron tube substitution manuals or charts	14
A	125	A4-6 Do you perform tasks on diode tubes	21
A	126	A4-7 Do you perform tasks on triode tubes	23
A	127	A4-8 Do you perform tasks on tetrode tubes	22
A	128	A4-9 Do you perform tasks on pentode tubes	21
A	129	A4-10 Do you perform tasks on beam power tubes	3
A	130	A4-11 Do you perform tasks on gas tubes	13
A	131	A4-12 Do you perform tasks on phantastrons	2
A	132	A4-13 Do you perform tasks on neon tubes	6
A	133	A4-14 Do you perform tasks on xenon tubes	3
A	134	A4-15 Do you perform tasks on nixie tubes	3
A	135	A4-16 Do you trace block diagrams of circuits containing cathode ray tubes (CRT)	6
A	136	A4-17 Do you trace schematic diagrams of CRT circuits	6
A	137	A4-18 Do you troubleshoot to isolate a faulty CRT	6
A	138	A4-19 Do you adjust or calibrate circuits that control CRT operations	6
A	139	A4-20 Do you perform tasks on electrostatic CRT	4
A	140	A4-21 Do you perform tasks on electromagnetic CRT	2
A	144	A5-4 Do you solder or desolder multi-layer circuit board connections	25
A	146	A5-6 Do you use crimping tool to repair or make connections	88
A	147	A5-7 Do you use wire wrap tool to make connections	71
A	148	A5-8 Do you use punch-on tool to make connections	62
A	149	A5-9 Do you repair or fabricate connectors or cables on multiconductor cables	70
A	150	A5-10 Do you repair or fabricate connectors or cables on coaxial cables	72
A	151	A5-11 Do you repair or fabricate connectors or cables on triaxial cables	31
A	152	A5-12 Do you repair or fabricate connectors or cables on ribbon cables	30

Tasks not referenced for duty B,
TEST EQUIPMENT

B	155	B1-3 Do you use the multimeter to extend the range of voltmeters using external shunts	19
B	158	B1-6 Do you use the multimeter to extend the range of ammeters using external shunts	14
B	166	B2-6 Do you use the oscilloscope to measure phase jitters	42

D	T	Task Title	306
Y	Nbr		50
B 168		B2-8 Do you use the oscilloscope to observe lissajous patterns	62
B 171		B2-11 Do you use delay time multipliers with oscilloscopes	25
B 173		B3-2 Do you use SG to perform alignments, adjustments, or calibrations	60
B 175		B3-4 Do you use audio sine-wave signal generators	54
B 176		B3-5 Do you use audio non-sinusoidal signal generators	17
B 177		B3-6 Do you use RF less than 1,000MH signal generators	19
B 178		B3-7 Do you use RF greater than 1,000MH signal generators	9
B 179		B3-8 Do you use white noise signal generators	7
B 180		B3-9 Do you use pattern signal generators	33
B 181		B3-10 Do you use pseudo-random signal generators	12
B 182		B3-11 Do you use time mark signal generators	11
B 184		B3-13 Do you use TV signal generators	3
B 185		B4-1 Do you use frequency counters	83
B 186		B4-2 Do you use spectrum analyzers	15
B 187		B4-3 Do you use field strength testers	3
B 189		B4-5 Do you use digital logic probes	17
B 190		B4-6 Do you use capacitance testers	17
B 191		B4-7 Do you use capacitor substitution boxes	5
B 192		B4-8 Do you use DC restorers (CRT rejuvenators)	4
B 193		B4-9 Do you use logic current tracers	6
B 194		B4-10 Do you use tube testers	13
B 195		B4-11 Do you use logic pulsers	6
B 196		B4-12 Do you use logic analyzers	8
B 197		B4-13 Do you use signature analyzers	4
B 198		B4-14 Do you use reflectometers	4

Tasks not referenced for duty C,
AMPLIFIER CIRCUITS

C 204		C1-6 Do you adjust or align transistor amplifiers	38
C 207		C1-9 Do you work on compound-connected (Darlington Pair) transistor amplifiers	11
C 209		C1-11 Do you work on paraphase transistor amplifiers	11
C 212		C1-14 Do you work on wideband transistor amplifiers	28
C 213		C1-15 Do you work on IF transistor amplifiers	12
C 214		C1-16 Do you work on RF transistor amplifiers	17
C 215		C1-17 Do you work on buffer transistor amplifiers	44
C 216		C1-18 Do you work on complementary symmetry transistor amplifiers	8
C 217		C1-19 Do you work on DC transistor amplifiers (switching applications)	42
C 223		C2-6 Do you perform tasks on diode stabilization amplifiers	33
C 224		C2-7 Do you perform tasks on double diode stabilization amplifiers	14
C 233		C3-9 Do you perform tasks on optical coupling circuits	9

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C 234	C4-1	Do you trace block diagrams of circuits containing electron tube amplifiers	17
C 235	C4-2	Do you trace schematic diagrams of electron tube amplifiers	18
C 236	C4-3	Do you troubleshoot to isolate a faulty electron tube amplifier	18
C 237	C4-4	Do you troubleshoot electron tube amplifiers to circuit level components	17
C 238	C4-5	Do you troubleshoot electron tube amplifier distortion	11
C 239	C4-6	Do you adjust or align electron tube amplifiers	12
C 240	C4-7	Do you measure electron tube amplifier voltage, current, or power gain	13
C 241	C4-8	Do you calculate values of electron tube amplifier voltage, current, or power gain	7
C 242	C4-9	Do you perform tasks on paraphase electron tube amplifiers	4
C 243	C4-10	Do you perform tasks on push-pull electron tube amplifiers	11
C 244	C4-11	Do you perform tasks on audio electron tube amplifiers	6
C 245	C4-12	Do you perform tasks on voltage regulator electron tube amplifiers	16
C 246	C4-13	Do you perform tasks on common grid electron tube amplifiers	15
C 247	C4-14	Do you perform tasks on common cathode electron tube amplifiers	16
C 248	C4-15	Do you perform tasks on cathode follower electron tube amplifiers	13
C 250	C5-2	Do you troubleshoot to isolate a faulty op amp circuit	40
C 252	C5-4	Do you adjust op amp bias, offsets, or drift	21
C 255	C5-7	Do you use or apply operational amplifiers for summing	9
C 256	C5-8	Do you use or apply operational amplifiers for unity gain amplifier (buffer)	20
C 257	C5-9	Do you use or apply operational amplifiers as active filters	19
C 258	C5-10	Do you use or apply operational amplifiers as oscillators	30
C 259	C5-11	Do you use or apply operational amplifiers as integrators	13
C 261	C5-13	Do you use or apply operational amplifiers for power supplies (voltage regulators)	41
C 262	C5-14	Do you use or apply operational amplifiers as analog/digital (A/D) digital/analog (D/A) converters	37
C 263	C5-15	Do you use or apply operational amplifiers as multivibrators	37
C 264	C5-16	Do you use or apply operational amplifiers as modulators/demodulators	33
C 265	C6-1	Do you trace block diagrams of circuits containing magnetic amplifiers	4

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C 266	C6-2 Do you trace schematic diagrams of magnetic amplifier circuits	4
C 267	C6-3 Do you troubleshoot to isolate a faulty magnetic amplifier	3
C 268	C6-4 Do you troubleshoot magnetic amplifiers to circuit level components	3
C 269	C6-5 Do you adjust magnetic amplifiers or components	2
C 270	C6-6 Do you trace block diagrams of circuits containing saturable reactors	3
C 271	C6-7 Do you trace schematic diagrams of saturable reactor circuits	3
C 272	C6-8 Do you troubleshoot to isolate a faulty saturable reactor	3
C 273	C6-9 Do you troubleshoot saturable reactors to circuit level components	3
C 274	C6-10 Do you adjust saturable reactor circuits or components	2

Tasks not referenced for duty D,
POWER SUPPLIES

D 283	D1-9 Do you perform tasks on three-phase rectifier power supplies	23
D 285	D1-11 Do you perform tasks on DC to DC converters	60
D 287	D1-13 Do you perform tasks on switching power supplies	16
D 303	D3-5 Do you perform tasks on variable resistor power supply voltage regulators	64
D 304	D3-6 Do you perform tasks on zener diode power supply voltage regulators	62
D 305	D3-7 Do you perform tasks on transistor series power supply voltage regulators	53
D 306	D3-8 Do you perform tasks on IC power supply voltage regulators	31
D 307	D3-9 Do you perform tasks on pulse width modulator power supply voltage regulators	20
D 309	D3-11 Do you perform tasks on crow bar power supply voltage regulators	10

Tasks not referenced for duty E,
REACTIVE CIRCUITS

E 315	E1-6 Do you calculate phase angle of RCL circuits	9
E 316	E1-7 Do you calculate values of power in RCL circuits	10
E 320	E2-4 Do you align or adjust frequency sensitive filters	23
E 321	E2-5 Do you calculate capacitance or inductance values for specific frequency sensitive filters	11

D	T Tsk	Y Nbr	Task Title	306	50	4
E	326		E2-10 Do you perform tasks on ferrite bead frequency sensitive filters			

Tasks not referenced for duty F,
WAVESHAPING/GENERATING CIRCUITS

F	329		F1-3 Do you troubleshoot to isolate a faulty oscillator circuit	65		
F	330		F1-4 Do you troubleshoot oscillators to circuit level components	59		
F	335		F1-9 Do the oscillators you work with use phase lock loops (PLL)	17		
F	339		F1-13 Do you perform tasks on Clapp oscillator circuits	11		
F	340		F1-14 Do you perform tasks on voltage control oscillators (VCO/VTD)	17		
F	341		F1-15 Do you perform tasks on crystal oscillator circuits	60		
F	342		F1-16 Do you perform tasks on Wien bridge oscillator circuits	7		
F	343		F1-17 Do you perform tasks on pulse generating oscillator circuits	22		
F	344		F1-18 Do you perform tasks on blocked/blocking oscillator circuits	6		
F	345		F1-19 Do you perform tasks on burst generators	6		
F	346		F1-20 Do you perform tasks on RC phase shift oscillators	16		
F	349		F2-3 Do you troubleshoot to isolate a faulty multivibrator circuit	62		
F	350		F2-4 Do you troubleshoot multivibrators to circuit level components	56		
F	352		F2-6 Do the multivibrators you work with use LC tank circuits	40		
F	354		F2-8 Do the multivibrators you work with use Crystals	45		
F	358		F2-12 Do you perform tasks on triggered astable multivibrators	46		
F	361		F3-3 Do you troubleshoot to isolate a faulty WSC	46		
F	362		F3-4 Do you troubleshoot WSC to circuit level components	42		
F	365		F3-7 Do you perform tasks on trapezoidal (ramp) wave generator WSC	11		
F	370		F3-12 Do you perform tasks on square wave generator WSC	44		
F	371		F3-13 Do you perform tasks on rectangular wave generator WSC	22		
F	372		F4-1 Do you trace block diagrams of circuits containing limiters	44		
F	375		F4-3 Do you trace block diagrams of circuits containing clammers	39		
F	379		F4-7 Do you troubleshoot to isolate a faulty clamper circuit	35		
F	380		F4-8 Do you troubleshoot clammers to circuit level components	33		
F	385		F4-13 Do you perform tasks on transistor limiter circuits	30		
F	386		F4-14 Do you perform tasks on triode limiter circuits	12		

D			
T	Task		306
Y	Nbr		50

Task Title

Tasks not referenced for duty G,
COMPUTERS, DIGITAL CIRCUITS, AND DEVICES

G 390	G1-2 Do you convert octal numbers to binary or binary numbers to octal	12
G 391	G1-3 Do you convert hexadecimal numbers to binary or binary numbers to hexadecimal	19
G 392	G1-4 Do you convert octal numbers to decimal or decimal numbers to octal	10
G 393	G1-5 Do you convert hexadecimal numbers to decimal or decimal numbers to hexadecimal	19
G 394	G1-6 Do you convert octal numbers to hexadecimal or hexadecimal numbers to octal	11
G 395	G1-7 Do you convert base number fractions to another base numbering system	9
G 396	G1-8 Do you add binary numbers	20
G 397	G1-9 Do you subtract binary numbers	18
G 398	G1-10 Do you multiply binary numbers	12
G 399	G1-11 Do you divide binary numbers	11
G 400	G1-12 Do you add octal numbers	9
G 401	G1-13 Do you subtract octal numbers	9
G 402	G1-14 Do you add hexadecimal numbers	14
G 403	G1-15 Do you subtract hexadecimal numbers	13
G 404	G1-16 Do you use binary coded decimal (BCD)	14
G 405	G1-17 Do you use gray codes	2
G 406	G1-18 Do you use ICAO codes	1
G 407	G1-19 Do you use excess-3 (XS3) codes	1
G 408	G1-20 Do you use parity bit codes	12
G 409	G1-21 Do you use biquinary codes	2
G 410	G1-22 Do you use ASCII codes	20
G 411	G1-23 Do you use EBCDI codes	3
G 414	G1-26 Do you troubleshoot digital systems to major units	55
G 430	G1-42 Do you perform tasks related to open collector gates (wired "AND" or wired "OR")	31
G 431	G1-43 Do you perform tasks related to buffers	46
G 433	G1-45 Do you perform tasks related to complemented flip flops	26
G 434	G1-46 Do you perform tasks related to complementing flip flops	26
G 436	G1-48 Do you develop logic diagrams from Boolean equations	17
G 437	G1-49 Do you simplify Boolean expressions using Boolean algebra	18
G 442	G1-54 Do you perform tasks on HTL (high threshold logic)	6
G 444	G1-56 Do you perform tasks on positive MOS ICs	10
G 445	G1-57 Do you perform tasks on negative MOS ICs	9
G 446	G1-58 Do you perform tasks on vertical MOS ICs	6

D	T	Task Title	306
Y	Nbr		50
G 447		G2-1 Do you trace block or schematic diagrams of computer controlled or computer based systems	13
G 448		G2-2 Do you load programs	16
G 449		G2-3 Do you write or debug programs	6
G 450		G2-4 Do you troubleshoot computers to a major unit	14
G 451		G2-5 Do you troubleshoot computers to a subassembly or circuit card	14
G 452		G2-6 Do you troubleshoot computer subassembly or circuit card to circuit level components or IC	6
G 453		G2-7 Do you use computer flow charts or diagrams	11
G 454		G2-8 Do you perform tasks on analog computers	7
G 455		G2-9 Do you perform tasks on digital computers	18
G 456		G2-10 Do you use Basic computer language	9
G 457		G2-11 Do you use COBOL computer language	2
G 458		G2-12 Do you use FORTRAN computer language	0
G 459		G2-13 Do you use ADA computer language	1
G 460		G2-14 Do you use ATLAS computer language	0
G 461		G2-15 Do you use ELAN computer language	0
G 462		G2-16 Do you use PASCAL computer language	1
G 463		G2-17 Do you use RPG computer language	0
G 464		G2-18 Do you use Machine computer language	5
G 465		G2-19 Do you use C computer language	0
G 466		G2-20 Do you perform tasks on magnetic (tape, disc, core) computer memories	15
G 467		G2-21 Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories	14
G 468		G2-22 Do you perform tasks on paper (tape, punch card) computer memories	2
G 469		G2-23 Do you perform tasks on advanced technology (bubble, CCD, electron beam, laser, thin film) computer memories	2
G 470		G2-24 Do you perform tasks on computer keyboards	17
G 471		G2-25 Do you perform tasks on computer character printers	11
G 472		G2-26 Do you perform tasks on magnetic tape drives	9
G 473		G2-27 Do you perform tasks on microprocessor computer terminals	9
G 474		G2-28 Do you perform tasks on video display unit (VDU/monitors)	11
G 475		G2-29 Do you perform tasks on paper tape readers/punches	4
G 476		G2-30 Do you perform tasks on paper card readers/punches	1
G 477		G2-31 Do you perform tasks on toggle or push button switch inputs	8
G 478		G2-32 Do you perform tasks on incandescent displays (Nixie tubes, LEDs, LCDs)	7
G 479		G2-33 Do you perform tasks on modems	26
G 480		G2-34 Do you perform tasks on line printers	9
G 481		G2-35 Do you perform tasks on floppy disc drives	9
G 482		G2-36 Do you perform tasks on removable cartridge disc drives	4
G 483		G2-37 Do you perform tasks on removable pack disc drives	3

D	T	Task Title	306
V	Nbr		50
G	484	G2-38 Do you perform tasks on fixed winchester type disc drives	3
G	485	G2-39 Do you trace block or schematic diagrams of microprocessor controlled systems	9
G	486	G2-40 Do you troubleshoot microprocessor controlled systems to a subassembly or circuit card	10
G	487	G2-41 Do you troubleshoot microprocessor controlled systems to isolate a faulty microprocessor	6
G	508	G3-21 Do you perform tasks on multiplexers	31
G	509	G3-22 Do you perform tasks on demultiplexers	24
G	510	G3-23 Do you perform tasks on comparators	32
G	511	G3-24 Do you perform tasks on parity generators or checkers	20
G	512	G3-25 Do you perform tasks on code converters	17
G	513	G3-26 Do you perform tasks on adders	38
G	514	G3-27 Do you perform tasks on subtractors	19
G	515	G3-28 Do you perform tasks on count detect circuits	16
G	516	G4-1 Do you trace data flow through A/D converters	41
G	517	G4-2 Do you trace data flow through D/A converters	41
G	518	G4-3 Do you troubleshoot A/D converter circuits	36
G	519	G4-4 Do you troubleshoot D/A converter circuits	36
G	520	G4-5 Do the converters you perform tasks on use flash conversion	3
G	521	G4-6 Do the converters you perform tasks on use successive approximation conversion	8
G	522	G4-7 Do the converters you perform tasks on use ramp conversion	3
G	523	G4-8 Do the converters you perform tasks on use R2R conversion	3

Tasks not referenced for duty H,

TRANSMISSION/RECEPTION CIRCUITS, DEVICES, AND SYSTEMS

H	524	H1-1 Do you measure electrical length on transmission lines	6
H	525	H1-2 Do you measure physical length on transmission lines	8
H	526	H1-3 Do you measure standing wave ratio (SWR) on transmission lines	5
H	527	H1-4 Do you construct transmission lines	9
H	528	H1-5 Do you match transmission line impedance with loads	17
H	529	H1-6 Do you calculate the characteristic impedance (Z0) of transmission lines	6
H	530	H1-7 Do you troubleshoot transmission lines	25
H	531	H1-8 Do you perform tasks on open-wire transmission lines	13
H	532	H1-9 Do you perform tasks on twisted pair transmission lines	26
H	533	H1-10 Do you perform tasks on twin lead transmission lines	15
H	534	H1-11 Do you perform tasks on flexible coaxial transmission lines	14

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D	T	Task Title	306
Y	Nbr		50
H 535		H1-12 Do you perform tasks on rigid coaxial transmission lines	8
H 536		H1-13 Do you perform tasks on fiber-optic transmission lines	9
H 537		H1-14 Do you trace schematic or block diagrams of circuits containing waveguides	1
H 538		H1-15 Do you troubleshoot circuits to isolate a faulty waveguide assembly	1
H 539		H1-16 Do you pressurize or purge waveguide assemblies	1
H 540		H1-17 Do you measure standing wave ratio for waveguide assemblies	1
H 541		H1-18 Do you remove or install waveguide or associated coupling hardware components	1
H 542		H2-1 Do you trace schematic or block diagrams of circuits containing microwave oscillators or amplifiers	1
H 543		H2-2 Do you troubleshoot circuits to isolate a faulty microwave oscillator or amplifier	1
H 544		H2-3 Do you tune or adjust microwave oscillators or amplifiers	0
H 545		H2-4 Do you perform tasks on two-cavity klystron microwave oscillators and amplifiers	0
H 546		H2-5 Do you perform tasks on three-cavity klystron microwave oscillators and amplifiers	0
H 547		H2-6 Do you perform tasks on reflex klystron microwave oscillators and amplifiers	0
H 548		H2-7 Do you perform tasks on traveling wave tube microwave oscillators and amplifiers	0
H 549		H2-8 Do you perform tasks on magnetron microwave oscillators and amplifiers	0
H 550		H2-9 Do you perform tasks on backward wave oscillator	0
H 551		H2-10 Do you perform tasks on parametric amplifiers	0
H 552		H2-11 Do you perform tasks on yttrium iron garnet (YIG) tuned microwave oscillators and amplifiers	0
H 553		H3-1 Do you trace schematic or block diagrams of circuits containing resonant cavities	1
H 554		H3-2 Do you troubleshoot circuits to isolate a faulty resonant cavity	1
H 555		H3-3 Do you tune or adjust resonant cavities electrically	1
H 556		H3-4 Do you tune or adjust resonant cavities physically	1
H 557		H3-5 Do you measure frequency of resonant cavities	1
H 558		H3-6 Do you perform tasks on probe resonant cavities	0
H 559		H3-7 Do you perform tasks on loop resonant cavities	0
H 560		H3-8 Do you perform tasks on aperture (iris/window) resonant cavities	0
H 561		H4-1 Do you use "AM" modulation principles	3
H 562		H4-2 Do you trace block diagrams of AM transmitters	3
H 563		H4-3 Do you trace block diagrams of AM transmitter subassemblies or circuit cards	3
H 564		H4-4 Do you trace schematic diagrams of AM transmitter subassemblies or circuit cards	3
H 565		H4-5 Do you troubleshoot AM transmitters to major units	3

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T Task		50
Y Nbr		
H 566	H4-6 Do you troubleshoot AM transmitters to subassemblies or circuit cards	3
H 567	H4-7 Do you troubleshoot AM transmitter subassemblies or circuit cards to circuit level components	2
H 568	H4-8 Do you align or adjust AM transmitters or circuits	3
H 569	H4-9 Do you calculate percentage of modulation for AM transmitters	1
H 570	H4-10 Do you use "AM" demodulation principles	2
H 571	H4-11 Do you trace block diagrams of AM receivers	2
H 572	H4-12 Do you trace block diagrams of AM receiver subassemblies or circuit cards	2
H 573	H4-13 Do you trace schematic diagrams of AM receiver subassemblies or circuit cards	2
H 574	H4-14 Do you troubleshoot AM receivers to major units	2
H 575	H4-15 Do you troubleshoot AM receivers to subassemblies or circuit cards	2
H 576	H4-16 Do you troubleshoot AM receiver subassemblies or circuit cards to circuit level components	1
H 577	H4-17 Do you align or adjust AM receivers or circuits	2
H 578	H4-18 Do you trace block diagrams of single side band (SSB) transmitters	2
H 579	H4-19 Do you trace block diagrams of SSB transmitter subassemblies or circuit cards	1
H 580	H4-20 Do you trace schematic diagrams of SSB transmitter subassemblies or circuit cards	1
H 581	H4-21 Do you troubleshoot SSB transmitters to major units	2
H 582	H4-22 Do you troubleshoot SSB transmitters to subassemblies or circuit cards	1
H 583	H4-23 Do you troubleshoot SSB transmitter subassemblies or circuit cards to circuit level components	1
H 584	H4-24 Do you align or adjust SSB transmitters or circuits	1
H 585	H4-25 Do you calculate percentage of modulation for SSB transmitters	0
H 586	H4-26 Do you trace block diagrams of SSB receivers	2
H 587	H4-27 Do you trace block diagrams of SSB receiver subassemblies or circuit cards	1
H 588	H4-28 Do you trace schematic diagrams of SSB receiver subassemblies or circuit cards	1
H 589	H4-29 Do you troubleshoot SSB receivers to major units	2
H 590	H4-30 Do you troubleshoot SSB receivers to sub-assemblies or circuit cards	1
H 591	H4-31 Do you troubleshoot SSB receiver subassemblies or circuit cards to circuit level components	1
H 592	H4-32 Do you align or adjust SSB receivers or circuits	1
H 593	H4-33 Do you use "FM" modulation principles	4
H 594	H4-34 Do you trace block diagrams of FM transmitters	4
H 595	H4-35 Do you trace block diagrams of FM transmitter subassemblies or circuit cards	3
H 596	H4-36 Do you trace schematic diagrams of FM transmitter subassemblies or circuit cards	3

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D Y Nbr	Task Title	306 50
H 597	H4-37 Do you troubleshoot FM transmitters to major units	3
H 598	H4-38 Do you troubleshoot FM transmitters to sub-assemblies or circuit cards	3
H 599	H4-39 Do you troubleshoot FM transmitter subassemblies or circuit cards or circuit level components	2
H 600	H4-40 Do you align or adjust FM transmitters or circuits	3
H 601	H4-41 Do you calculate modulation index for FM transmitters	1
H 602	H4-42 Do you measure frequency deviation for FM transmitters	2
H 603	H4-43 Do you use "FM" demodulation principles	3
H 604	H4-44 Do you trace block diagrams of FM receivers	3
H 605	H4-45 Do you trace block diagrams of FM receiver subassemblies or circuit cards	2
H 606	H4-46 Do you trace schematic diagrams of FM receiver subassemblies or circuit cards	2
H 607	H4-47 Do you troubleshoot FM receivers to major units	2
H 608	H4-48 Do you troubleshoot FM receivers to subassemblies or circuit cards	2
H 609	H4-49 Do you troubleshoot FM receiver subassemblies or circuit cards to circuit level components	1
H 610	H4-50 Do you align or adjust FM receivers or circuits	2
H 611	H4-51 Do you plot receiver signal level curves (RSL) for FM receivers	0
H 612	H4-52 Do you use "PM" modulation principles	2
H 613	H4-53 Do you trace block diagrams of PM transmitters	2
H 614	H4-54 Do you trace block diagrams of PM transmitter subassemblies or circuit cards	2
H 615	H4-55 Do you trace schematic diagrams of PM transmitter subassemblies or circuit cards	2
H 616	H4-56 Do you troubleshoot PM transmitters to major units	2
H 617	H4-57 Do you troubleshoot PM transmitters to sub-assemblies or circuit cards	2
H 618	H4-58 Do you troubleshoot PM transmitter subassemblies or circuit cards to circuit level components	2
H 619	H4-59 Do you align or adjust PM transmitters or circuits	2
H 620	H4-60 Do you calculate pulse recurrence time (PRT) or pulse recurrence frequency (PRF) for PM transmitters	0
H 621	H4-61 Do you measure PRT, PRF or pulse width for PM transmitters	1
H 622	H4-62 Do you use "PM" demodulation principles	2
H 623	H4-63 Do you trace block diagrams of PM receivers	2
H 624	H4-64 Do you trace block diagrams of PM receiver subassemblies or circuit cards	2
H 625	H4-65 Do you trace schematic diagrams of PM receiver subassemblies or circuit cards	2
H 626	H4-66 Do you troubleshoot PM receivers to major units	2
H 627	H4-67 Do you troubleshoot PM receivers to subassemblies or circuit cards	2
H 628	H4-68 Do you troubleshoot PM receiver subassemblies or circuit cards to circuit level components	1
H 629	H4-69 Do you align or adjust PM receivers or circuits	2

D	Tsk	Task Title	306
Y	Nbr		50
H 630		H5-1 Do you physically align antennas	6
H 631		H5-2 Do you electrically align antennas	3
H 632		H5-3 Do you troubleshoot loading of antennas	2
H 633		H5-4 Do you troubleshoot coupling of antennas	3
H 634		H5-5 Do you plot graph radiation patterns	1
H 635		H5-6 Do you troubleshoot antenna components	3
H 636		H5-7 Do you measure standing wave ratio (SWR) for antennas	1
H 637		H5-8 Do you work with Yagi antennas	1
H 638		H5-9 Do you work with dipole antennas	3
H 639		H5-10 Do you work with slotted antennas	1
H 640		H5-11 Do you work with rotary antennas	2
H 641		H5-12 Do you work with hertz antennas	0
H 642		H5-13 Do you work with marconi antennas	0
H 643		H5-14 Do you work with rhombic antennas	0
H 644		H5-15 Do you work with scimitar antennas	0
H 645		H5-16 Do you work with parabolic antennas	1
H 646		H5-17 Do you work with ground plane antennas	1
H 647		H5-18 Do you perform tasks on rotary antenna arrays	1
H 648		H5-19 Do you perform tasks on stacked (end fire) antenna arrays	0
H 649		H5-20 Do you perform tasks on broadside antenna arrays	1
H 650		H5-21 Do you perform tasks on cardioid antenna arrays	1
H 651		H5-22 Do you perform tasks on collinear antenna arrays	0
H 652		H5-23 Do you perform tasks on phase antenna arrays	1
H 653		H5-24 Do you perform tasks on planar antenna arrays	0
H 654		H5-25 Do you perform tasks on antennas with vertical polarization	2
H 655		H5-26 Do you perform tasks on antennas with horizontal polarization	2
H 656		H5-27 Do you perform tasks on antennas with circular polarization	1
H 657		H5-28 Do you perform tasks on antennas with unidirectional radiation patterns	3
H 658		H5-29 Do you perform tasks on antennas with bidirectional radiation patterns	3
H 659		H5-30 Do you perform tasks on antennas with omnidirectional radiation patterns	3

Tasks not referenced for duty I,
RADIO FREQUENCY (RF) MEASUREMENTS OR CALCULATIONS

I 660	I1-1	Do you measure RF power	3
I 661	I1-2	Do you measure RF peak power	2
I 662	I1-3	Do you measure RF average power	2
I 663	I1-4	Do you measure RF effective power	1
I 664	I1-5	Do you measure RF output power using wattmeters	2
I 665	I2-1	Do you calculate RF apparent power	1
I 666	I2-2	Do you calculate RF true power	1

D	T Task	Task Title	306
Y Nbr			50

I 667	I2-3	Do you calculate RF power loss or gain in db	3
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Tasks not referenced for duty J,
ADDITIONAL CIRCUITS, DEVICES, SYSTEMS, OR ITEMS

J 668	J1-1	Do you trace block diagrams of circuits containing microphones	19
J 669	J1-2	Do you trace schematic diagrams of microphone circuits	18
J 670	J1-3	Do you troubleshoot to isolate a faulty microphone	21
J 671	J1-4	Do you troubleshoot microphones	11
J 672	J1-5	Do you work on carbon microphones	17
J 673	J1-6	Do you work on capacitor microphones	4
J 674	J1-7	Do you work on crystal microphones	5
J 675	J1-8	Do you work on dynamic microphones	12
J 676	J1-9	Do you work on velocity ribbon microphones	3
J 677	J1-10	Do you trace block diagrams of circuits containing speakers	20
J 678	J1-11	Do you trace schematic diagrams of speaker circuits	18
J 679	J1-12	Do you troubleshoot to isolate a faulty speaker	19
J 680	J1-13	Do you troubleshoot speakers	10
J 681	J2-1	Do you trace block diagrams of circuits containing photosensitive devices	3
J 682	J2-2	Do you trace schematic diagrams of photosensitive device circuits	3
J 683	J2-3	Do you troubleshoot to isolate a faulty photo-sensitive device	3
J 684	J2-4	Do you adjust or calibrate photosensitive devices	1
J 685	J2-5	Do you work on photodiodes	3
J 686	J2-6	Do you work on phototransistors	2
J 687	J2-7	Do you work on phototubes	0
J 688	J2-8	Do you work on photo-SCRs	0
J 689	J2-9	Do you work on photocells (Photoconductive or Photovoltaic)	1
J 690	J3-1	Do you trace block diagrams of circuits containing display tubes	0
J 691	J3-2	Do you trace schematic diagrams of display tubes or circuits	0
J 692	J3-3	Do you troubleshoot to isolate a faulty display tube	0
J 693	J3-4	Do you adjust or calibrate display tubes or circuits	0
J 694	J3-5	Do you work on direct view storage tubes (DVST)	0
J 695	J3-6	Do you work on multiple mode storage tubes (MHST)	0
J 696	J3-7	Do you work on scan converter tubes (SCT)	0
J 697	J4-1	Do you trace block diagrams of TV systems or subassemblies	0
J 698	J4-2	Do you trace schematic diagrams of TV systems or component circuits	0

D	T	Task Title	306
Y	Nbr		50
J 699		J4-3 Do you troubleshoot TV systems to major subassemblies	0
J 700		J4-4 Do you troubleshoot TV systems to circuit level components	0
J 701		J4-5 Do you adjust or calibrate TV systems or components	0
J 702		J4-6 Do you trace block diagrams of laser systems or subassemblies	0
J 703		J4-7 Do you trace schematic diagrams of laser systems or component circuits	0
J 704		J4-8 Do you troubleshoot laser systems to major subassemblies	0
J 705		J4-9 Do you troubleshoot laser systems to circuit level components	0
J 706		J4-10 Do you adjust or calibrate laser systems or components	0
J 707		J4-11 Do you trace block diagrams of infrared systems or subassemblies	1
J 708		J4-12 Do you trace schematic diagrams of infrared systems or component circuits	0
J 709		J4-13 Do you troubleshoot infrared systems to major subassemblies	0
J 710		J4-14 Do you troubleshoot infrared systems circuit level components	0
J 711		J4-15 Do you inspect, clean, or service infrared systems or components	1
J 712		J4-16 Do you adjust or calibrate infrared systems or components	0